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ART. I.—ON MARRUBIUM VULGARE.

BY JOSEPH ALLEN M'MAKEN.

(*Extract from an Inaugural Thesis.*)

The author after a general view of the botanical and medical characteristics of the plant, arrives at the following results, by a series of experiments, viz: That marrubium vulgare contains gum, tannic acid, vegetable albumen, resin, volatile oil, fatty matter, wax, potassa, chlorophyllin, lignin, and a peculiar crystalline bitter principle, soluble in alcohol and ether and insoluble in water. The process for isolating this principle, as given by the author, is contained in the following extract from his inaugural essay.—Ed.

"Three ounces of the dried herb were macerated in a pint of water acidulated with hydrochloric acid for twenty-four hours, and then boiled for fifteen minutes and strained. The residue was boiled in three successive portions of water acidulated as before, and all the liquid pressed out and strained. These clear solutions were mixed and heated to the boiling point, when slaked lime was gradually added until it ceased to precipitate. The precipitate thus obtained was separated, washed well with water, pressed and dried; and then, after being pulverized, was digested in suc-

cessive portions of boiling alcohol until all the bitterness was removed. These solutions were mixed and evaporated until a black oily substance remained, which was well washed with boiling water, re-dissolved in alcohol, and the alcoholic solution boiled with animal charcoal, filtered and evaporated to a small bulk and set aside. When cold, crystals were deposited, which were contaminated with fatty matter. The impure crystals were dissolved in a large portion of cold alcohol, and the fatty matter separated by filtration. The solution, after being boiled with animal charcoal, filtered, and concentrated, yielded fine silky needle-shaped crystals of a white color, which weighed four and a half grains when dried. This substance, from subsequent experiments, appears to be the bitter principle. It is insoluble in water, soluble in ether, and more so in hot than in cold alcohol; it is perfectly neutral, having no effect on either turmeric or litmus; is destitute of odor, but having in solution a very intensely permanent bitter taste, and melts like resin when heated.

Neither the sulphuric or hydrochloric acids produce any change, but nitric acid causes it to assume a deep yellow color. It does not unite with either acids or alkalis, nor is it precipitated by subacetate of lead, corrosive sublimate, the persalts of iron, or iodine."

ART. II.—NOTE ON VALERIANATE OF ZINC.

BY WILLIAM PROCTER, JR.

HAVING had occasion to prepare this salt several months ago, the inconvenience of distilling so bulky an article as valerian (which swells much by maceration) was found to be so great, that in order to supersede the necessity of placing the root in the still the following method was re-

sorted to, viz. Four pounds of valerian in coarse powder were thrown into two gallons of hot water, in which had been dissolved four drams of caustic potassa; the whole was heated for a short time, and then allowed to macerate for twenty-four hours, and then displaced with water until the liquid passing possessed but little taste. The clear infusion, which was slightly acid to litmus paper, was saturated, and evaporated until reduced to two pints, and as much diluted sulphuric acid was added as would neutralize the quantity of alkali employed. By this means the valerianate of potassa formed in the infusion was decomposed, and its acid set free. The whole was then placed in a glass retort on a sand bath, the distillation conducted until the liquid passing over was but slightly acid to litmus. The liquid in the receiver consists of a saturated solution of valerianic acid, with globules of that acid floating on its surface.

The next step in the process consists in preparing the hydrated carbonate of zinc by precipitation from a solution of the pure sulphate, by carbonate of soda, and washing to remove the saline matter.

The valerianic solution is then placed in a suitable vessel, an excess of the hydrated carbonate added, and the mixture heated until effervescence ceases and the saturation is effected,—the liquid should then be filtered, evaporated and crystallized. If the process has been carefully conducted, the product will amount to two drams, or about thirty grains per pound.

The salt thus obtained is often colored brownish, and if required, can be obtained white by re-dissolving, treating with charcoal and again crystallizing. Since adopting this method, which yields a larger product than by saturating the distilled water with the hydrated carbonate, I have seen a similar suggestion in the *L'Abeille Medicale*, by M. Guilleminet Macors, Pharmacien of Lyons, who, however, employed the carbonate of potassa.

M. Rabourdin, Pharmacien at Orleans, employs the following process, viz: About eleven pounds of valerian to be distilled with a sufficient quantity of water, containing three troy ounces of concentrated sulphuric acid. When thirty pints of product has been obtained by distillation, the volatile oil is separated and the liquid saturated with from 22 to 25 drams of carbonate of soda, then evaporated to one pint, a slight excess of sulphuric acid added, and then distilled. By this process M. Rabourdin obtained from 11 to 12 drams of valerianic acid—a much larger quantity than is usually obtained.

By whatever process made, there should always be sufficient water to hold all the valerianate in solution when the liquid is hot, else a portion may be lost in separating the excess of carbonate of zinc. The salt requires about fifty times its weight of water for solution.

ART. III.—REPORT OF THE NEW YORK COLLEGE OF PHARMACY.

At a Stated Meeting of the Board of Trustees of the College of Pharmacy of the city of New York, held April 3d, 1845, an extract from the minutes of the last meeting of the College was read, in which a report from the Committee of Inspection was referred to the present Board, with instructions to proceed with it as they may think advisable.

Whereupon, it was on motion

Resolved, That a copy of the report of the Committee of Inspection be forwarded to the publishers of the American Journal of Pharmacy for publication, with the addition that the article has been sold by the importors to

wholesale druggists, and is now supposed to be in the market.

As far as the Board of Trustees are informed, it is in stone ware tie-over pots, containing one and a half pounds each.

COPY OF REPORT.

The Committee of Inspection beg leave to report that a specimen of blue mass was handed to them by Mr. Aspinwall, imported by Cumming, Main & Co., as is said, from Mr. William Bailey, of Wolverhampton, England, and supposed to contain 25 per cent. of mercury. Mr. Aspinwall sent a sample to Professor Reid for examination, who reports it to contain 10 per cent. of mercury, besides a considerable quantity of weighty earthy matter, probably added with a view of increasing its specific gravity. On application to the Professor, he handed to the Chairman a sketch of his method of analysis, herewith enclosed, and he also offered to repeat it before the Board.

All of which is respectfully submitted.

C. ADAMSON, Chairman.

By order,

JOHN MEAKIM, Secretary.

New York, March 19th, 1845.

ART. IV.—ON THE CONVERSION OF BENZOIC INTO HIPPURIC ACID.

BY JAMES C. BOOTH AND MARTIN H. BOYÉ, M.D.

(*From the Transactions of the American Philosophical Society.*)

THE importance of the application of chemical principles to the various processes in the animal economy, not less than their interesting character in a scientific point of view, having led us to undertake a few experiments on a singular fact observed some years since by Woehler, we have deemed them worthy of being offered to your notice on the present occasion, although time has failed in completing the series of investigations which was contemplated. I therefore propose to offer you a few remarks on the "Conversion of Benzoic into Hippuric Acid," which are the results of the conjoint labors of Professor Booth and myself.

Before entering into the details of the present treatise, it may not be out of the way to make a few remarks on some of the most important ingredients of urine, as far as connected with the present subject; urine contains about ninety-three parts of water and seven of solid substances. Of these seven parts of solid substances, a substance called urea forms three parts. About two parts are formed by inorganic substances, such as chlorides of potassium, sodium and ammonium, sulphates of soda and potassa, and the phosphates of lime, magnesia, soda and ammonia; while the remaining two parts are mostly formed of other organic substances, as extractive matters, mucus of the bladder, some lactic acid and uric acid.

Urea is in every respect the most remarkable substance in the urine, and that which imparts to it its most peculiar characters. It is a white crystallizable substance, and very soluble in water. It seems to stand on the borders between

organic and inorganic substances. It may be produced artificially from inorganic substances, and is itself readily converted into carbonate of ammonia by taking up the elements of one atom of water. It combines with some acids, such as the nitric and oxalic acids, and performs in these compounds the part of a base.

Lithic or uric acid forms only a very small part of the urine; being about one-seventieth of the solid substances, and only one-ten thousandth part of the whole urine. It is very insoluble in water, and this is the reason that it for the most part deposits from urine on cooling. By oxidation it yields, among other products, urea. It forms the greater part of urinary concretions.

The urine of herbivorous animals does not contain any uric acid, but another acid, called hippuric acid, from ἵππος a horse, in whose urine it was first discovered. It only contains seven per cent. of nitrogen, while uric acid contains thirty-three per cent. By oxidation, it yields, among other products, benzoic acid.

The urine of the horse sometimes contains benzoic acid instead of hippuric. Benzoic acid is generally obtained from gum-benzoin by subjecting it to a gentle heat; when it sublimes in crystalline needles. It will be observed that it contains no nitrogen. It belongs to a series of compounds, which in a historical point of view are of interest, as containing the first well established radical in organic chemistry; that is to say, an imaginary body, which, though never isolated by itself, may be carried through a series of combinations with most of the simple elementary bodies.

The question now naturally arises, how is this transformation of benzoic acid into hippuric effected? We have seen that the normal quantity of uric acid is too small to suffice, if its formation depended on this acid, and, besides, their formation seems independent of each other. That the transformation should be effected in the stomach and intestines during the digestion is less probable: it seems

more probable to suppose that it takes place during the subsequent circulation of the blood, and that its formation is connected with that of the urea. We know that at least the principal source of urea is the transformation of the tissues in the body, or what Prout calls the destructive assimilation, since its formation continues, when animals are fed exclusively on non-nitrogenized food, and when they are starved; and that it is not secreted by the kidneys, but actually formed in the body, and merely excreted by them, is proved by removing them, when urea will be found in the blood. The same occurs by suppression of urine. I have myself lately had an opportunity to confirm this observation, in examining, at the request of Drs. Pepper and Sargent, the blood of a patient who for some time previous to her death had a complete suppression of the urine. But the question then is,—is it merely a simple chemical reaction between the benzoic acid and the products of the transformations of the tissues, or does it actually affect the chemical changes, by which the latter are effected, so as to cause new chemical products to be their results. Liebig takes this latter view in his Animal Chemistry. We quote his own words:

"Benzoic acid, when administered internally, appears in the form of hippuric acid. Should the observation be confirmed, it will acquire great physiological significance, since it would plainly prove, that the act of the transformation of the tissues in the animal body under the influence of certain matters taken in the food, assumes a new form with respect to the products, which are its results; for hippuric acid contains the elements of one at. of urea, one of lactic acid, and two of benzoic acid."

Liebig then at once proceeds to make an application of this fact to the action of medicinal agents. We are not disposed to dispute his theories on this point, nor deny that such may be the case in active remedies, but we believe that he is too prompt in drawing the conclusion, that be-

cause benzoic acid is converted into hippuric by entering into the system, it should, therefore, necessarily affect the usual chemical changes in the body. We are disposed to consider it as a mere chemical reaction between the benzoic acid and the substances of the blood, either those which are used for the formation of the tissues, or, more probably, those which result from their dissolution. But if this be correct, it follows, that we may be able to perform the same transformation out of the body. It was with a view of determining this point that our experiments were undertaken, and we still look for success, although they have not hitherto afforded a satisfactory result.

Woehler was the first to observe that benzoic acid, when administered internally to a dog, and again separated from the urine, reappeared as prismatic crystals, unlike benzoic acid; and he conjectured correctly, from their resemblance to hippuric acid, that the former by passing through the system was converted into the latter. He also suggested, that this might be the source of the hippuric acid in the urine of herbivorous animals, since the benzoic acid might be supposed to occur in their food, and by the digestion be converted into hippuric. Ure subsequently stated, that he had found hippuric acid in the urine of a patient who had taken benzoic acid; he also supposed that the uric acid had been employed in this conversion, and recommended it as a remedy for calculous concretions of uric or lithic acid. This induced Keller, at the instigation of Woehler, to make some experiments on this point, which he published in Liebig's Annals of Chemistry and Pharmacy. He took, in the evening before bed-time, two grammes or about thirty-one grains of benzoic acid, and found the next morning, on examining the urine, that by the addition of chlorohydric acid it deposited long prismatic crystals, which it continued to do as long as he continued the use of benzoic acid. By re-dissolving these crystals in hot water and treating them with animal charcoal, he obtained them perfectly colour-

less. The crystals thus obtained behaved in all respects like pure hippuric acid. They fused easily, and by a stronger heat they charred with a smell of oil of bitter almonds and sublimation of benzoic acid. He also determined the quantity of carbon, which he found to agree with that of hippuric acid, namely, 60.7 per cent., while benzoic acid contains 69.1 per cent. of carbon.

Keller furthermore ascertained that the urine from which hippuric acid had been separated, deposited a large amount of nitrate of urea, on the addition of nitric acid. It had also previously deposited uric acid. It therefore contained these two usual ingredients of urine. He also inferred, that since the urine could be inspissated without depositing hippuric acid before the addition of chlorohydric acid, it was evident that the hippuric acid existed in combination with a base.

As hippuric acid may be said, to a certain extent, to replace uric acid in the herbivorous mammalia, this probably led Ure to the supposition that the uric acid was employed in the conversion of the benzoic acid; but Keller's experiment showed that the urine deposited uric acid, and that therefore this latter assertion could not be correct.

We have repeated Keller's experiments, and with the same results. We have in general found that after the use of benzoic acid the urine makes a copious deposite of uric acid, both in the red or dark-colored variety and in that of a clay-colored or muddy appearance.

In one experiment the urine was examined in the morning when no benzoic acid had been taken. It deposited no sediment on cooling, and when tested for uric acid by the addition of nitric acid, the latter effected after twenty-four hours a deposite of only a few isolated colorless crystals scattered over the inside of the vessel. The same day two grammes of benzoic acid were taken immediately after dinner. Twenty minutes afterwards the urine was voided, evaporated to one-fourth its volume, and chlorohydric acid

added. After the lapse of twenty-four hours it had deposited a precipitate of a granular appearance and of a very dark-red nearly black color, which dissolved with effervescence in nitric acid, and on evaporation yielded the beautiful purple color of purpuric acid. It therefore consisted of uric acid. Twenty minutes after the first, another portion was obtained, which, treated in the same way, yielded a precipitate in all respects similar to the above. Its quantity also had not diminished; but besides this precipitate there appeared a moderate quantity of needle-shaped crystals of hippuric acid.

These experiments evidently show that the formation of hippuric acid does not diminish the quantity of the uric acid, and that the formation of the former seems entirely independent and disconnected with that of the latter. The urine voided in the morning had a sp. gr. of 1.0112. That voided three or four hours after dinner, and therefore containing most of the hippuric acid, had a sp. gr. of 1.024. Its color was but slightly more yellow than the former.

Distinction is generally made between the urine secreted after fluids have been taken, especially on an empty stomach, and that secreted subsequently to the digestion of food. The former is much more limpid and tasteless, and contains much less of the solid ingredients. It has been found, that if any substance be taken under the first circumstances, dissolved in the water, it passes much more rapidly into the urine, where some substances have been detected in the short time of from two to ten minutes after their introduction into the stomach; while, when taken with the food, they generally require a much longer time for their reappearance in the urine. In regard to the time which elapses before the benzoic acid reappears as hippuric, it will be seen that in the above experiments it had not yet appeared there in twenty minutes, and that forty minutes after being taken its appearance had but fairly commenced. In another experiment, where the benzoic

acid was taken immediately before dinner, a portion of urine, obtained immediately after the meal, and about thirty minutes after the introduction of the acid yielded, when treated as above, an abundant crop of crystals. It was interesting to ascertain how long the hippuric acid would continue to appear in the urine from the time the benzoic acid was taken. In an experiment, where two grammes were taken before and two grammes more immediately after dinner, the urine secreted (from seven to eleven o'clock in the evening or) from four to eight hours after its introduction contained an abundance of hippuric acid, while none could be detected in the urine voided after that time the next morning.

The quantity of hippuric acid obtained exceeds that of the benzoic acid taken; six grammes taken, two grammes after breakfast, two before and two after dinner, yielded in two experiments about eight grammes of crude hippuric acid, or about one-third more than its own weight.

It was a matter of considerable interest to ascertain with what base the hippuric acid occurred combined in the urine, whereby it was held in solution till liberated by an acid. The bases occurring in the urine are potassa, soda, lime, magnesia, and ammonia. Besides these, urea seems in some instances to have a basic nature: thus, in the compounds which it forms with nitric and oxalic acids it evidently acts the part of a base. Cap and Henry have asserted that a portion of it occurs combined with lactic acid in human urine and with hippuric acid in urine of the horse, and they prescribed a method of forming these two compounds by double decomposition of lactate or hippurate of lime and oxalate of urea, and they also described the methods by which they had extracted the lactate of urea from human urine, and the hippurate of urea from the urine of the horse. The former was repeated by Lecanu, who could obtain no lactate of urea. Cap and Henry replied, and gave a new method of obtaining it in crystals by

shaking the inspissated urine with a mixture of one volume of alcohol and two volumes of ether, and evaporating the solution by heat over sulphuric acid in a closed vessel. Very recently Pelouze has shown, that neither lactate nor hippurate of urea can be obtained by double decomposition, or in any other way, and that they therefore do not exist, and that Cap and Henry had nothing but urea, which had imbibed the acids.

If hippurate of urea therefore existed, it would not be improbable that this acid might occur combined with urea in the urine, and in our experiments particular attention was paid to this point. The urine was evaporated, filtered, and further evaporated in a water-bath to a thick syrup, and then left at rest for several weeks, in the hope that the combination of hippuric acid would crystallize. A quantity of crystals appeared, which, being well drained from the mother-liquid, were found to contain no hippuric acid. They consisted chiefly of chlorides of ammonium and sodium, with the phosphates of the same bases. The mother-liquid, on the contrary, formed nearly a solid mass when tested for hippuric acid by the addition of chlorohydric acid. By adding more water, and straining the mother-liquid from the crystals, subsequent addition of nitric acid caused an abundant precipitate of nitrate of urea. The main mass of the syrup was now shaken for several days in a closed bottle with a mixture of one volume of alcohol and two volumes of ether, which were decanted and evaporated by heat over sulphuric acid. While concentrating, it yielded prismatic crystals, and finally the whole was converted into a mass of crystals with but little mother-syrup. The crystals were carefully dried between blotting paper. They were, therefore, obtained according to Cap and Henry's directions for extracting the lactate of urea; but they proved to be pure urea, so that unless the lactic acid has been employed in the formation of hippuric acid, lactate of urea is not obtained in this way, and at all events

it shows that urea is also dissolved by this process. The same proceess of extraction was repeated with a fresh portion of the same mixture, and with the same results; but the evaporation was not carried so far, in order to be able to examine the mother-liquid. We obtained a crop of crystals of pure urea, containing no hippuric acid, while the mother-liquid had a bitterish taste, but did not yield hippuric acid by the addition of chlorohydric acid. It was therefore evident that the above mixture extracted pure urea, while it left behind the combination of hippuric acid. We next employed a mixture of equal volumes of alcohol and ether, which dissolved a much larger quantity from the original syrup, but on evaporation yielded only a slight crop of crystals. The greater part of it remained as a thick syrup, yielding an abundance of crystals of hippuric acid by the addition of chlorohydric acid, but also a large amount of nitrate of urea by the subsequent addition of nitric acid. It was therefore evident that the compound of hippuric acid was also extracted by the last treatment, and it merely remained to find the base. A few drops of the syrups charred and incinerated, left no residue, proving the absence of all the fixed bases of the urine. The hippuric acid could therefore only be combined with urea or ammonia, to ascertain which chlorohydric acid was added to a portion of it, and after the separation of the hippuric acid, chloride of platinum added, which caused a very copious precipitate of chloroplatinate of ammonium. The addition of nitrate of silver and nitric acid to the liquid proved it to contain a certain amount of chlorine as chloride of ammonium, but much less than would be able to yield a precipitate so copious as the above. We, therefore, continued the extraction by fresh portions of equal volumes of alcohol and ether, and thus succeeded in obtaining a solution that yielded by evaporation a viscid mass, which, by addition of chlorohydric acid, gave an abundance of hippuric acid, and by subsequent addition of chloride of platinum a cor-

responding copious precipitate of chloroplatinate of ammonium; but on the addition of nitric acid it yielded no nitrate of urea nor any trace of this substance by evaporation, but only copious crystals of chloride of ammonium. It was thus made evident that urea is not combined with the hippuric acid, but that the base which retains it in solution, and with which it is combined, is ammonia. It also confirms the assertion of Pelouze that hippurate of urea does not exist.

The results of the foregoing experiments may be summed up thus:

1. The formation of uric acid in healthy urine is not affected either in regard to its quantity nor to its external properties in general by the introduction and transformation of benzoic acid into hippuric acid in the system.

2. The time required for the benzoic acid to pass through the system, and reappear as hippuric in the urine, is from twenty to forty minutes after its introduction with food into the stomach. Its occurrence continues for four or eight hours, but then ceases.

3. The quantity of hippuric acid obtained from the urine is greater than that of the benzoic acid taken. In round numbers it may be stated to be one-third more.

4. Urea is not in combination with the hippuric acid in the urine.

5. The base with which the hippuric acid is combined, and which keeps it in solution, is ammonia.

ART. V.—ON THE ACTION OF LEAD IN DISTILLED AND RIVER WATER.

BY RICHARD PHILLIPS, JUN.

THE author considers, from the action which is the subject of his paper, the following points of interest to arise: 1st, whether it is necessary that the lead should be exposed to the air, or whether the action would take place if it were below the surface of the water; 2nd, whether pure or distilled water, deprived of all atmospheric air, has any action on lead; 3rd, as to what is the nature of the white precipitate; 4th, if, besides this white precipitate, any soluble salt of lead is found; and 5th, as to which of the salts contained in river-water the non-formation of the white precipitate is due.

He proceeds to notice the remarks of Dr. Christison and Colonel Yorke on these subjects, and then gives his own experiments.

As to the first. In bottles containing distilled water were placed two pieces of lead of nearly equal size. In both a white precipitate occurred, but in that in which the lead had been exposed above the surface of the water, a far greater quantity than in the one where the lead had been covered with the water; and he concludes from this experiment, that although it is not necessary that the lead should be exposed above the surface of the water for the action to take place, still by offering a passage to the gases contained in the atmosphere it accelerates it.

The author observes, "I have before stated, Dr. Christison does not describe the method by which he performed his experiment on the non-solubility of lead in pure distilled water; and although I agree with him as to the fact, as I found some difficulty in ascertaining it, I will describe the process I followed. I found that on boiling pure distilled

water so as to deprive it of all atmospheric air, that when it had regained its former temperature, and was placed in a well-stoppered bottle with a piece of lead, the bottle being perfectly full, although no action was apparent, and the lead remained almost as bright as when first placed in the bottle, yet if a little hydrosulphuric acid was added to the water, it instinctly became of a brown color, showing the presence of lead, the water having on cooling absorbed sufficient atmospheric air to act on the lead. If, on the contrary, the water was placed in the bottle when warm, and the lead immediately added, and the bottle stoppered, on cooling a vacuum was formed, which it was impossible to maintain, and the lead was acted upon. I therefore repeated the last experiment, but took the precaution, when the bottle was quite full and no vacuum had formed, to plunge the stopper under mercury, and to pour water above the mercury. The experiment was allowed to remain for some months; the lead retained its original brightness; and on breaking off the neck of the bottle, it being impossible on account of the vacuum to take out the stopper, not the slightest effect was produced on the liquid by hydrosulphuric acid, thus proving that pure water, without the presence of air, has no action on lead.

"From my experiments I am led to the same conclusion as Colonel Yorke, as to the manner of the formation of the white precipitate; in fact, I have obtained small masses of crystalline scales, which have formed on the surface of lead, which have dissolved without the slightest effervescence in acetic acid. I do not think, however, any fixed composition can be assigned to this substance, as on repeating his experiment of drying it under the air-pump upon two different specimens, one of which had been kept some years, and the other only a few weeks, in the former a much larger amount of carbonic acid was found than in the latter, showing that the precipitate had no definite composition, but that it depended, as to the quantity of carbo-

nic acid, on the length of time it had been exposed in the solution.

"As to the existence of either of the salts of lead mentioned in a soluble state, I must confess that I differ with the two authorities I have named, and believe that what they consider to have dissolved is merely the hydrated oxide of lead held in a state of mechanical suspension, and for the following reasons:—I found that, in repeating an experiment of Colonel Yorke's, that of precipitating hydrated oxide of lead and washing it with warm distilled water, that the filtered liquor gave a brown precipitate with hydrosulphuric acid, after all the soluble salts formed had been washed away; but that on refiltering a portion of it through more than one filter, not the slightest discoloration was given to the liquor by the test; and as Colonel Yorke considered that the soluble salt was the hydrated oxide, a greater quantity of which would exist, as already shown, at the commencement of the action of the lead on the water, I placed a piece of lead in distilled water, and carefully tested the filtered liquor daily, for some weeks, with hydrosulphuric acid, but in no case could I find the slightest discoloration given to it. Now as the test is so delicate as to be capable of discovering, according to Pfaff, a 100,000th part of the metal in solution, if, as Colonel Yorke states, a 10,000th part of the oxide is held in solution, the test would of course have distinctly shown it.

"Dr. Christison considering that the action of the formation of a soluble salt of lead was due to the carbonate of lead becoming converted into bicarbonate by long exposure, I tested the liquid from one of the experiments I have before mentioned, when the lead in distilled water had been exposed to the action of the atmosphere for six years, and could not detect the slightest discoloration after the solution had been carefully filtered. I therefore conclude from these experiments, and I believe Dr. Thomson has previously arrived at the same result, that no soluble salt of

lead is formed by the action of atmospheric air on lead in distilled water."

As to the last question, "to which of the salts contained in river-water the non-formation of the white precipitate is due," the author states that it is the sulphate of lime, and considers that the chloride of sodium, which has been generally supposed to be capable of exercising this preservative power, does not possess it, on account of its forming when decomposed a salt of lead partly soluble.

In conclusion, he remarks that the non-action of rain-water which had fallen, after a long continuance of dry weather, on lead, is probably due to the small amount of carbonate of ammonia which is contained in atmospheric air. *London Chemical Gazette.*

ART. VI.—ON THE LIQUEFACTION OF GASES.

BY PROFESSOR FARADAY.

The author, in a letter to M. Dumas, gives the following account of his mode of experimenting:—

I sought in the first place to obtain a very low temperature, and employed for this purpose Thilorier's bath of solid carbonic acid and æther, placing it however under the recipient of an air-pump. By maintaining a constant vacuum, I lowered the temperature to such a degree, that the carbonic acid of the bath was not more volatile than water at the temperature of 86°, for the barometer of the air pump stood at 28.2 inches, the external barometer being at 29.4.

This arrangement made, I joined together, by means of corks and stop-cocks, some small glass and copper tubes, so

that with the aid of two pumps I was able to subject various gases to a pressure of 40 atmospheres, and at the same time to submit them to the intense cold obtained under the air-pump, and to examine the resulting effects. As I expected, the cold produced several results which pressure alone would never have done, and principally in the solidification of bodies ordinarily gaseous. The following is a sketch of the various results :—

Olefiant gas was condensed to a beautiful colorless transparent liquid, but it did not solidify ; it dissolves the resinous, bituminous and oily bodies.

Pure *hydriodic acid* may be obtained either in the solid or liquid state. Solid hydriodic acid is very clear, colorless and transparent; generally several fissures traverse the mass; it greatly resembles ice.

Hydrobromic acid may also be obtained either as a limpid and colorless liquid, or as a clear transparent solid.

Both these acids require a very careful distillation in closed vessels and under great pressure, to be obtained pure and colorless.

Fluosilicic acid was condensed to the liquid state, but it is requisite to operate at the lowest temperature. It is extremely liquid and mobile, like hot æther ; it then produces a pressure of about 9 atmospheres, and gives no sign of solidification. It is transparent and colorless.

Fluoboric acid and *phosphuretted hydrogen* presented some results of condensation.

Hydrochloric acid liquifies readily at less than 1 atmosphere of pressure, but it does not solidify.

Sulphurous acid freezes immediately, as was to be expected.

Sulphuretted hydrogen becomes solid, and then forms a white, transparent, crystalline mass, bearing greater resemblance to solid nitrate of ammonia or to camphor, than to ice.

Carbonic acid, when it passes from the liquid to the solid

state without being dispersed in the form of snow, constitutes a very beautiful substance, transparent like crystal, so that for some time I doubted whether the tube which contained it was empty or full; and I was even obliged, in order to ascertain the presence of the solid body, to melt a portion of it. Solid carbonic acid exerts a pressure of 6 atmospheres, which proves how readily liquid carbonic acid ought to become solid when allowed to escape into the free air.

Oxide of chlorine is a beautiful, orange-red, very friable, crystalline substance. It exhibits no trace of explosive power.

Protoxide of nitrogen is one of the gases which I had formerly condensed. I have seen in the journals that M. Natterer has repeated my experiments with a compression-pump, and that he has obtained the liquid in the open air. I have likewise condensed it to a liquid by means of my pump, but I have moreover solidified it by means of the cold bath. It then forms a beautiful transparent or colorless crystalline body, but in this state the pressure of its vapor does not amount to that of 1 atmosphere; and this result is confirmed by another experiment, in which, having opened a vessel containing this liquid, a portion evaporated, cooled the remainder, but did not solidify it. The cold produced by this evaporation is very intense, which was proved by placing the tube and its contents in a bath of solid carbonic acid and æther in the air. This bath, which instantly freezes mercury, behaved like a vessel filled with hot liquor, and immediately caused the protoxide of nitrogen to boil violently. It is therefore my intention to employ the liquid protoxide of nitrogen for some new experiments on hydrogen, oxygen and nitrogen; for on placing a bath of this liquid protoxide in the receiver of an air-pump, and expelling the air and the gas, we are able to place the bath of the protoxide relatively to that of the carbonic acid *in vacuo*, in the same relation that the two baths observe in the air.

Cyanogen freezes, as was already proved by Bussy.

Perfectly pure and dry *ammonia* may be obtained as a transparent, crystalline white substance, heavier than liquid ammonia, and diffusing very little odour, from the weak tension of its vapor at this temperature.

Arseniuretted hydrogen and *chlorine* do not pass from the liquid to the solid state.

Alcohol becomes thick like cold oil, but does not crystallize any more than *caoutchene, camphene* and *oil of turpentine,* but these bodies become viscid.

Binoxide of nitrogen and *oxide of carbon* did not exhibit the least sign of liquefaction at the lowest temperature, and at a pressure of 30 to 35 atmospheres.

While making these general observations, I have determined several numbers relative to the point of fusion of these various gases and their tension at different temperatures. The numbers will be given in the memoir which I am preparing on this subject, and in which I hope to have something new to say respecting the state which oxygen, nitrogen or hydrogen may affect in passing to the liquid state. Will this latter body present itself in the metallic form, as you think? Will nitrogen prove to be a metal, or retain its place among the non-metallic bodies? This, experience will show.—*Ibid, from Ann. de Chim. et de Phys.*

ART. VII.—EXAMINATION OF JALAP RESIN.

BY G. A. KAISER.

Besides the ordinary *Jalapa tuberosa* or *ponderosa*, which occurs from the size of a nut to that of a fist, and which is derived from *Ipomœa Schiedeana*, Zuc., there is also met with at present another kind derived from *Ipomœa orizabensis*, which is paler, more fibrous, has a fainter smell and taste, and is known by the name of *Rad. Jalapæ fusiformis s. lævis* (*Stipites Jalapæ*). The resins from both agree, and are thereby distinguished from all other resins with which they might possibly be adulterated, in their being gradually dissolved by concentrated sulphuric acid, and depositing after some hours a brown smeary resin. Both are however essentially distinct. The resin from *Ipom. orizabensis* is simple and entirely soluble in æther; this was examined by Johnston, and found to be C^{40} H^{34} O^{18}; the author found C^{42} H^{34} O^{18}, and calls it *Pararhodeoretine.* The resin from *Ipom. Schiedeana* consists, on the contrary, of a soft resin soluble in æther and a resin insoluble in æther, which the author terms *Rhodeoretine*, which is identical with the Jalapine of Herberger and Buchner, but does not possess the properties of a base, but those of an acid, is decomposed by concentrated acids like salicine into grape-sugar and *Rhodeoretinole* = C^{42} H^{35} O^{20}, and gives an hydrate and various salts. This resin has likewise been examined by Cadet de Gassicourt and Gœbel.

Rhodeoretine: Preparation.—The root of *Ipom. Schiedeana* was treated with alcohol of 0.863 spec. grav., the extract mixed with water, and the alcohol removed by distillation; the dark brown resin was separated, boiled with water, and then washed with hot water as long as anything was removed, upon which it was again dissolved in alcohol of 0.863 spec. grav., and the solution digested two or three

times with washed animal charcoal until it acquired a bright, faint, wine-yellow color; the filtered alcoholic solution was then diluted with water and the alcohol distilled off. The resin obtained had a slight yellowish tint, and was of the consistence of Venetian turpentine, was boiled with distilled water, and treated several times with water, which takes up a considerable quantity of resin. Thus purified and evaporated to dryness in a water-bath, the resin formed a yellowish-white brittle mass, which possessed the well-known smell of jalap. The dry resin was boiled in a retort with æther as long as anything was removed. Finally, the resin was re-dissolved in a little alcohol, and then precipitated with æther. In this manner a colorless, perfectly transparent resin was obtained, a thin dry layer of which on a glass plate could scarcely be distinguished by the eye. The resin was then evaporated in a water-bath to dryness.

When pulverized it forms a nearly white powder, without smell or taste, insoluble in water and æther, but very readily soluble in alcohol. It is thrown down of a white colour from this alcoholic solution by water; the precipitate dissolves entirely in ammonia and acetic acid. The alcoholic solution has a faint acid reaction, dissolves but sparingly in cold potash, soda and the carbonate alkalies, but entirely on the application of heat. From these solutions acids do not precipitate it any longer; it dissolves entirely in cold concentrated ammonia with a light brownish color; on expelling the excess of ammonia by heat a neutral solution is obtained, which may be mixed in all proportions with alcohol and water. The solution of this neutral salt of ammonia is not precipitated by nitrate of silver, neutral acetate of lead, chloride of barium or sulphate of copper; a flocculent precipitate is obtained only by means of basic acetate of lead. The solutions of the potash and soda salt behave towards these reagents just as the ammonia salt. Since the above method would not suffice to obtain

a combination of the resin with earths and metallic oxides in the solid form, an alcoholic solution of the resin was boiled with hydrate of lime and magnesia; but none of the oxides could be detected in the filtered liquid. The resin was thrown down unaltered by water, nor was there in the residue any combination of the resin with the bases. Upon this an alcoholic solution was mixed with water till the resin began to separate; it was then boiled with oxide of lead, hydrate of lime and magnesia, but no salt could be obtained in a solid state even in this manner. If a solution of the ammonia salt is boiled with hydrate of lime until no more ammonia is given off, a lime salt is formed, soluble in water and alcohol, but from which no resin can be separated by muriatic acid. Treated in the same manner with hydrate of barytes, a salt readily soluble in water and alcohol is likewise obtained, but from which no resin could be separated by means of acids. Acetic acid dissolves the resin with ease; concentrated nitric acid dissolves it in the cold unaltered; when ammonia is added it again separates; cold dilute nitric acid does not dissolve it; on the application of heat it is dissolved with decomposition; it is insoluble in cold dilute, but is decomposed by concentrated sulphuric acid; moistened with it on a watch-glass, each particle becomes, in about ten minutes, of a beautiful carmine red, and dissolves; the liquid acquires a darker colour, and after some hours a brownish-black resinous body separates. Heated on platinum-foil, the resin first melts, and becomes brown, with evolution of a peculiar empyreumatic odour, and then burns with a bright, somewhat smokey flame, leaving behind a porous shining cinder, which at last disappears entirely. At 302° it melts to a bright yellow transparent mass, without however parting with any more water.

The pure resin was pulverized, dried at 212°, and burnt with chromate of lead. It furnished—

			Equiv.	Calculated.
Carbon	56.49	56.35	42	56.66
Hydrogen	77.94	7.89	35	7.78
Oxygen	35.5	35.76	20	35.56

Salt of Ammonia.—Some ammonia was poured over a quantity of the resin, and digested with it until it was entirely dissolved. The liquid, which had a somewhat brownish color, was warmed until the excess of ammonia had been removed and the liquid had become perfectly neutral. On evaporation in the water-bath, the combination formed a brownish resinous mass, which was very readily soluble in alcohol and water; it possessed no odour, a bitter taste, and on treating it with potash it liberated ammonia.

Lead Salt.—A solution of the ammonia salt in water was mixed with some basic acetate of lead as long as any precipitate resulted, and the white flocculent deposit obtained carefully washed with water. Dried and pulverized it forms a powder.

Hydro-rhodeoretine.—To obtain the acid combined with the oxide of lead, the lead salt, carefully washed, was suspended in distilled water, and a current of sulphuretted hydrogen gas passed through it, frequently stirring, until it was entirely decomposed. The liquid filtered from the sulphuret of lead was transparent, and afforded on evaporation in the water-bath a slightly brownish resinous mass, possessing the following properties:—When dry it resembles externally the original resin, is quite as brittle and as easily pulverized; it dissolves readily in water and in alcohol, but is insoluble in æther, has no odour, but a tolerably strong, pure bitter taste. It melts on platinum foil, and then burns, giving off the same odour and the same bright, somewhat smoky flame, as rhodeoretine, leaving behind a porous cinder, which is consumed without residue. The aqueous solution has an acid reaction, and is neither rendered turbid by solutions of neutral metallic salts nor by those of the alkaline earths. The original lead salt is obtained only with basic acetate of lead, or with the neutral acetate and the addition of ammonia. It likewise dissolves in alkalies and carbonate alkalies, and forms the same salts as those obtained by dissolving the original resin in alka-

lies. It does not crystallize either from the alcoholic or from the aqueous solution; it dissolves in acetic acid and in cold nitric acid without decomposition. Water and ammonia do not again precipitate it. Like rhodeoretine it becomes colored of a beautiful carmine red after a few minutes with concentrated sulphuric acid; and it likewise deposits after decomposition a brownish-black resinous mass, with the same peculiar odour; at 212° it cakes together; some few degrees above this temperature it melts to a yellow fluid. The pulverized acid, dried at 212°, was burnt with chromate of lead, and afforded—

Carbon	55.10	55.16	42 =	3185.8	55.54
Hydrogen	8.28	8.39	36	449.3	7.83
Oxygen	36.62	36.45	21	2100.0	36.63

Potash Salt.—For the preparation of this salt a quantity of rhodeoretine was conveyed into a boiling solution of carbonate of potash, in which it dissolved tolerably easy with a yellow color. The solution was then evaporated to dryness in the water-bath, and the dry mass extracted with absolute alcohol. The potash compound dissolved in it, and the excess of carbonate of potash remained undissolved. The alcoholic solution was evaporated to dryness; the dry pulverized salt had a faint yellowish color, and dissolved both in alcohol and readily in water; the aqueous solution had a bitter taste and an agreeable quince-like odour. Heated on platinum foil, it burnt with the same bright flame as rhodeoretine.

Barytes Salt.—A certain quantity of hydro-rhodeoretine was dissolved in water, a slight excess of barytes water added to the solution, and the whole then evaporated until the excess of barytes was converted into carbonate, and the liquid no longer had an alkaline reaction; it was then filtered and evaporated to dryness in the water-bath. Dry and pulverized, the salt forms an almost perfectly white powder, which is easily soluble in water and alcohol, but is precipitated from the aqueous solution by absolute

alcohol. It has no odour, but a bitter taste; heated on platinum, it first melts, and then burns with a bright flame, diffusing the same odour as rhodeoretine. It melts at 221°. The analyses of the salts gave the following results :—

		Lead Salt.			
Carbon,	36.95	37.31	42	= 3185.87	37.37
Hydrogen,	5.32	5.40	36	449.3	5.27
Oxygen,	25.29	24.85	21	2100.0	24.65
Oxide of lead,	32.44	32.44	2	2789.0	32.71
				8524.17	
		Barytes Salt.			
Carbon,	51.11	50.94	84	= 6371.7	51.27
Hydrogen,	7.55	7.54	72	898.6	7.23
Oxygen,	33.71	33.89	42	4200.0	33.01
Barytes,	7.63	7.63	1	956.9	7.69
				12427.2	
		Potash Salt.			
Carbon,	53.49	53.37	126	= 9557.6	53.70
Hydrogen,	7.78	7.66	108	1347.9	7.57
Oxygen,	35.63	35.60	63	6300.0	35.42
Potash,	3.37	3.37	1	589.9	3.31
				17795.4	

Decomposition of Rhodeoretine by Acids.—A quantity of rhodeoretine was dissolved in absolute alcohol, and dry hydrochloric acid gas passed through the solution as long as any was absorbed. In this operation it became of a dark reddish-yellow color. The solution was corked and set aside for ten days, when it had become considerably darker and opake in mass. Mixed with water, a dark yellow oily liquid separated, which had an agreeable smell and dissolved in æther. The entire liquid was mixed with water, and then shaken with æther, which took up the

oily liquid, acquiring a dark yellow color; the remaining alcoholic solution continued of a dark yellow-red color. The æthereal solution was washed with water, to separate the hydrochloric acid, and then exposed to the air. A dark brownish-yellow, thick, oily fluid separated on evaporation of the æther, which possessed a strong and not disagreeable odour. The neutral liquid volatilized with difficulty, but entirely, on exposure to heat, and burnt with a red flame. Boiled with solution of caustic potash, no action resulted; cold concentrated sulphuric acid was likewise without any effect upon it. The liquid was placed over sulphuric acid for some days, and then submitted to analysis, with the following results:—

Carbon,	66.95	66.65	30	67.51
Hydrogen,	10.67		23	8.53
Oxygen,	22.38		8	23.96

The author has given the name of *Rhodeoretinol* to this body, from its origin and consistence.

The acid liquid separated from the rhodeoretinol was saturated with carbonate of lead, the filtered liquid evaporated to dryness in the water-bath, and extracted with absolute alcohol. A viscid transparent mass was obtained, which had a sweetish taste, dissolved in water and alcohol, burnt on platinum foil, giving off the well-known odour of burnt sugar; and when warmed with potash and sulphate of copper, exhibited the characteristic reaction of grape-sugar by the reduction of the oxide of copper, gave the characteristic crystals with common salt, and finally, on being dissolved in water and brought into contact with yeast, passed into vinous fermentation. It is evident from these reactions that this substance is identical with grape-sugar, &c.

The author made the same experiment with a solution of hydro-rhodeoretine in absolute alcohol and hydrochloric acid gas, as with rhodeoretine. The solution acquired a dark yellow color, and on mixing with water white flakes separated,

which on being magnified exhibited the appearance of minute coherent drops of oil, and dissolved in æther. The æthereal solution, freed by washing with water from acid, gave on evaporation in the air a brown waxy mass, which possessed a similar odour to the rhodeoretinol. The acid solution, from which the substance had been removed by æther, likewise yielded, with excess of potash and sulphate of copper, the reaction of grape-sugar.

Resin soluble in Æther.—The æthereal extract of the resin, which was of a dark yellow color, was evaporated by exposure to the air, when a clear brownish-yellow liquid mass separated, which on solution in alcohol was thrown down by water as a brownish oily mass, which also separated any remaining portions of rhodeoretine. The mass, purified by being again dissolved in alcohol and precipitated with water, possessed the following properties:—It was strongly acid towards blue litmus-paper, left a grease-spot on paper, possessed a very strong disagreeable smell, resembling that of the jalap-root, and an irritating taste, and was insoluble in hydrochloric, nitric and acetic acids even on warming. It dissolves in an aqueous solution of potash or soda, and is separated unaltered by muriatic acid. The alcoholic solution is precipitated by an alcoholic solution of acetate of lead with a yellow color; it does not crystallize either from the æthereal or from the alcoholic solution, and remains, even after several months, still quite soft and smeary. Left in contact with water for some length of time, it is converted into a mass of prismatic acicular crystals, which adhere together, and even after several months form a smeary mass.

Pararhodeoretine.—A quantity of the accurately-determined root of *Ipomea orizabensis*, Pellet., was exhausted with alcohol, the extract mixed with water, and the alcohol removed by distillation; the resin so obtained was washed with hot water, again dissolved in alcohol and entirely decolorized by means of washed animal charcoal. The resin obtained by distilling off the alcohol, and boiling in water after desiccation in the

water-bath, formed when pulverized a nearly white powder, which dissolved entirely in alcohol and æther to a transparent clear liquid. It is entirely dissolved by warm aqueous solutions of potash, soda, and the carbonate alkalies, and is separated by muriatic acid from these solutions in white flakes. Concentrated sulphuric acid dissolves it in the course of five to ten minutes with a beautiful purple-red color; after some time a brown smeary resin separates. It melts when heated on platinum foil, and burns when ignited with a bright, somewhat smoky flame, leaving a porous coal, which can be entirely consumed. It possesses neither smell nor taste, is very brittle and easily pulverized. The resin obtained by evaporating the alcoholic solution in the water-bath, and dried at 212°, gave on combustion with chromate of lead the following result:—

Carbon,	58.58	58.64	42 =	3185.9	58.88
Hydrogen,	8.01	8.13	34	424.3	7.84
Oxygen,	33.41	33.23	18	1800.0	33.28

According to Johnston, the resin of Scammony = $C^{40} H^{33} O^{20}$. The resins of the *Convolvulaceæ* abound, therefore, most in oxygen, and form by the soluble hydrorhodeoretine the transition from salicine and phloridzine. 7 equivalents starch ($C^{84} H^{70} O^{70}$) = 2 equiv. rhodeoretine + 30 O.

Chem. Gaz. from Liebig's Annalen.

ART. VIII.—ON LIMONE.

BY DR. C. SCHMIDT.

This substance, which was discovered by Bernays, in the pips of lemons and oranges, is probably contained in the seed of all the *Aurantiaceæ*. From the author's investigation it appears that it is not a base, and does not contain any nitrogen. It is obtained in the form of a white crystalline powder; its crystals belong to the rhombic system. This substance is very sparingly soluble in water, æther and ammonia, somewhat more in mineral acids, more easily in alcohol and acetic acid, but most readily in potash, from which solution it is precipitated unaltered by acids. Concentrated sulphuric acid dissolves it with a blood-red color, from which water precipitates it, as well as from the alcoholic and acetic solutions, unchanged; it is carbonized by heat. When neutralized with carbonate of barytes, no barytes remains in the solution. It crystallizes readily from acetic acid; the crystals are free from chemically combined acetic acid. The alcoholic solution has a neutral reaction; it neither affords precipitates with chloride of platinum nor with perchloride of mercury, with salts of lead nor with those of silver, potash, barytes and others (the latter must naturally be dissolved in alcohol, as otherwise the pure substance is precipitated by the water of the saline solution.) It can be heated to 302° without undergoing change, and without any remarkable loss in weight; at a higher temperature it suddenly becomes yellowish, and melts at 471° to a liquid of the same colour, which resembles a melting resin; it resolidifies to an amorphous mass, and even after several days does not present any trace of crystalline structure; it may, however, be dissolved in acetic acid by long digestion in the warmth, from which it crystallizes in the form and with the properties of the original unmelted substance.

The indifference of this substance towards oxidizing agents

is remarkable; concentrated nitric acid dissolves it, especially with the assistance of a little heat; the solution is of a pale yellow, and even after long heating it is precipitated by water from the solution in an unaltered state. On boiling it with a concentrated solution of bichromate of potash it undergoes no change, nor with free chromic acid, *i. e.* sulphuric acid and chromate of potash, in which solution it floats unaltered even after boiling for several hours. The acetic solution has a strong bitter taste; however, it does not appear to produce any considerable physiological effects. 60 millegrammes, dissolved in acetic acid and taken early in the morning before breaking fast, produced no effect; nothing could be detected in the secretions. 25 millegrammes were given to a dog, and 10 millegrammes to a bird, but likewise without any effect.

The elementary composition proved the perfect identity of the substance prepared from lemon and orange pips, and gave as the mean of several analyses, in 100 parts—

Carbon,	66.09	42	66.17
Hydrogen,	6.55	25	6.55
Oxygen,	27.36	12	27.32

The formula is that of phloridzine, dried at 212° + 2 equiv. oxygen. Direct experiments, with reducing agents, such as sulphurous acid, hydrochloric acid, sulphuretted hydrogen, hydrogen in *statu nascenti*, and the electric current, afforded, however, by their negative results, the proof that this substance does not belong to the phloridzine series, especially as the characteristic decomposition of salicine by chromic acid was wanting. The combining weight could not be ascertained, since it was impossible to obtain combinations of this substance with other bodies.

Ibid, from Göttinger gel. Anz.

ART. IX.—ON THE ORGANIC ACIDS OF LACTUCA VIROSA AND SATIVA. By M. Köhnke.

Numerous doubts having been raised against the distinctness of the so-called lactucic acid of Pfaff; the author has endeavored to settle these, and has found that the fresh plant contains no oxalic acid, but *malic* and *succinic acids;* that, on the contrary, no succinic but oxalic acid occurs in the lactucarium. The author's experiments are as follows:—

Fresh entire plants of *Lactuca virosa* were cut into pieces, digested for several hours in warm water, boiled for a time, expressed and filtered, the solution precipitated with basic acetate of lead, the precipitate collected, washed, suspended while still moist in distilled water, and decomposed by sulphuretted hydrogen. The colored acid liquid obtained was evaporated at a moderate heat; it finally congealed to a thick jelly. It had been ascertained by previous experiment that the acid was soluble in spirit, the gelatinous substance insoluble; the mass was therefore treated with strong alcohol and warmed, when the latter substance separated in whitish lumps. This substance, after removal, dissolved with difficulty in water, very readily in dilute muriatic acid, from which solution it was thrown down as a voluminous precipitate on saturating the acid with caustic ammonia. It had a horny appearance when dried, a dirty yellowish color, and was now perfectly insoluble in water, and very sparingly soluble in dilute muriatic acid.

The acid spirituous solution, which still appeared much colored, and but little of which color could be removed by treatment with purified animal charcoal, was mixed with water, the alcohol distilled off at a very gentle heat, and more water added to the residue, which was then saturated with carbonate of ammonia, which considerably decolorized the liquid and

removed some carbonate of lime; on filtration and evaporation an acid crystalline salt of ammonia was obtained, which was procured in very white masses by frequent recrystallization with addition of caustic ammonia.

The salt was dissolved in water, again precipitated with basic acetate of lead, the precipitate collected, edulcorated and decomposed with sulphuretted hydrogen, upon which the clear acid was evaporated to a certain degree, and then exposed to the heat of summer. In the course of 14 days numerous crystals had formed, which in 14 days more, during which time the solution had evaporated down to about half, increased considerably in quantity and size, and after careful collection and washing with a little cold water appeared as prismatic trilateral columns with obtuse terminations; those, on the contrary, which were applied to the side of the basin resembled butterflies' wings; the latter crystals, dissolved in spirit and crystallized, then dissolved in water and recrystallized, formed colorless, regular, prismatic, tabular crystals.

The residuous acid liquid was mixed with water and with sulphuret of barium, and finally saturated with some carbonate of barytes, the soluble salt of barytes carefully decomposed with dilute sulphuric acid, and the acid obtained evaporated. It could not be obtained in a crystalline state, but when dried for several weeks at a moderate heat formed a white efflorescent salt. This dried acid, heated in a glass tube, was decomposed with effervescence and evolution of irritating acid vapors, which were partly deposited on the cold sides of the tube in the form of a sublimate (maleic acid) and the residue consisted of a white acid crust (fumaric acid.) It was consequently *malic acid*. For further confirmation the acid was dissolved in water, and chloride of potassium added to the solution, and to another sample, lime-water; both, however, without producing any change. A solution of acetate of lead immediately formed a caseous precipitate, which melted like a resin in boiling water.

The precipitate obtained by saturating with sulphuret of

barium and carbonate of barytes was collected and treated with dilute sulphuric acid, filtered, an excess of milk of lime added to the acid fluid, and filtered boiling. On evaporating the filtered solution some small crystals separated, characterized by their being decomposed when heated in a glass tube with evolution of vapors, which excited coughing, and with the deposition of an acid sublimate. The residue from the treatment with milk of lime behaved therefore like citrate of lime, from which moreover a small quantity of pure citric acid was obtained in a crystalline state. For this purpose the lime salt was carefully decomposed with sulphuric acid, the filtered solution having however been previously examined for tartaric and oxalic acids. Chloride of calcium and chloride of ammonium added to a portion saturated with caustic ammonia produced no turbidness; a portion to which a slight excess of caustic ammonia had been added, and then a solution of gypsum, exhibited, even after a long time, no change; a sample rendered neutral, and boiled with chloride of calcium and caustic ammonia, immediately afforded a white pulverulent precipitate.

The acid first obtained in prismatic tabular crystals was now submitted to a more accurate examination, and accordingly heated in a glass tube; it was entirely volatile, with evolution of abundant vapors, which excited coughing, and deposition of a sublimate resembling that of the lime salt already mentioned; treated with chlorine and nitric acid, the crystals again afforded the same acid.

The acid required 2 parts alcohol, 3 parts hot and 24 parts cold water, for solution.

A sample was now dissolved in water, and tested with the reagents mentioned by Pfaff. It immediately caused a considerable brownish turbidness in neutral protosulphate of iron; a solution of acetate of magnesia produced no change, which was likewise the case with sulphate or acetate of copper, which however were precipitated of a light blue color, when the acid was neutralized with caustic ammonia. The acid, dissolved

in water and neutralized with caustic ammonia, was employed for the following reactions:—Acetate of barytes and solution of lime, as well as solution of gypsum, produced no change; acetate of lead, a precipitate which was soluble in the free acid, in dilute nitric acid, and in an excess of the precipitant; nitrate of silver, a pulverulent precipitate soluble in caustic ammonia and nitric acid; solution of corrosive sublimate, no change; but with solution of the protonitrate of mercury, an abundant caseous precipitate; perchloride of iron, a dark brown voluminous precipitate; and acetate of zinc, a white precipitate, which was soluble in much hot water.

From these preliminary tests, there can be scarcely any doubt that the peculiar acid of the plant is *succinic acid.*

Lactuca sativa was treated in the same manner as *Lactuca virosa*, and curiously enough yielded the same results, except as to the amount of succinic and malic acids. 100 lbs. of the fresh *Lactuca sativa* gave 122 grs. of succinic acid and 11 drms. of dried malic acid; 50 lbs. of fresh *Lactuca virosa* yielded 28 grs. pure crystallized succinic acid and 3 drms. of dried malic acid.

An *Extractum Lactucæ virosæ* afforded, when treated in a similar manner, on an average 1 gr. of succinic acid per ounce. In this examination the tests for oxalic acid were likewise repeated, but with a negative result.

According to the most recent analysis, an oxalate is constantly contained in lactucarium; the author convinced himself of its presence in some *Lactucarium anglicum*, procured in commerce, which on extraction with boiling water, treating the solution with basic acetate of lead, and decomposing the lead salt with sulphuretted hydrogen, yielded the acid in considerable quantity and in beautiful prismatic needles, and likewise citric and malic acids; no succinic acid however could be detected in the lactucarium, of which two ounces were employed.

To ascertain, moreover, whether the oxalic acid probably existed in the *Lactuca* as oxalate of lime, and could conse-

quently not be extracted by water, the following experiments were made on some pounds of the dried plant *Lactuca sativa*, collected in the flowering season. The plant, cut into small pieces, was treated with warm water containing nitric acid, then expressed, filtered, and the acid saturated with carbonate of ammonia, then boiled, filtered, precipitated with basic acetate of lead, the precipitate washed and decomposed with sulphuretted hydrogen, which operation was again repeated; finally, the colorless solution was evaporated and set aside in a warm place. After a considerable length of time a crystalline mixture was obtained in a syrupy fluid, which collected carefully, brought on to bibulous paper and recrystallized, gave prismatic crystals.

A portion of the acid, saturated with caustic ammonia, did not afford any oxalic acid, but only succinic and citric acids, which yielded, on separation by means of lime-milk and decomposition of the lime salts, pure crystallized succinic and citric acids. The quantity of succinic acid which was obtained this time was considerably greater than previously.—*Ibid, from Archiv. der Pharm.*

ART. X.—ANALYSIS OF ERGOT.

BY M. SEGRIP.

Fatty oil, thick, very fluid at + 25° of a beautiful yellow,	34.50
Amidine,	2.75
Albumen,	1.00
Inulin,	2.25
Gum,	2.50
Uncrystallizable sugar,	1.25
Resin, very brown,	2.75
Fungin,	3.50
Vegeto-animal matter,	13.50
Osmazome,	0.75
Fat acids,	0.50
Coloring Principles { 1. Reddish brown, made violet by an alkali, rose-yellow by an acid, insoluble in alcohol. 2. Brown, yellow by ammonia, not colored by acids, soluble in alcohol, }	0.50
Odorous principle not isolated,	
Fungate of potassa,	2.25
Chloride of sodium,	0.50
Sulphate of lime, Sulphate of magnesia,	0.50
Subphosphate of lime,	1.25
Oxide of iron,	0.25
Silica,	0.15
Water,	0.15
Loss,	2.35
	100.00

M. Segrip has essayed the therapeutic action of some of these products, and the results at which he has arrived,

differ from those that have been announced by other experimenters. Thus he has been able to administer a large dose of the oil of ergot to a young animal, without any apparent effect being visible. The alcoholic extract exhibited the same inefficiency. He has not, moreover, found the same crystalline matter, *crystine*, which has been announced by Mr. Vallet, and regrets that the author has not indicated the method by which he obtained it.

Journ. de Pharmacie.

The point of interest in this analysis, is the detection of that peculiar principle, *Fungin*, which is the characteristic of the *Fungi tribe* of vegetables, and which corroborates the views of those naturalists, who regard the origin of Ergot as fungous.—*Ed. Amer. Journ. Pharm.*

ART. XI.—ON THE CONDENSATION OF NITROGEN BY VEGETABLE MOULD, AND ON THE NUTRITIVE POWER OF THE SOIL.

BY PROFESSOR MULDER.

Mulder does not admit with Liebig, that the whole of the nitrogen of unmanured soil can be derived from the ammonia contained in the atmosphere. Even supposing, what has not been proved, that 1 lb. of rain-water contained ¼ gr. of ammonia, this quantity could never occur except at the commencement of a rain, and the water subsequently falling could contain scarcely any or no ammonia. The author, in his researches on the constituents of mould, has been led to quite a different mode of accounting for the nitrogen of the soil, as will be seen from the memoir in our last number. From that it is evident that ammonia is pro-

bably first formed, out of this nitric acid, and from the latter, under the influence of the hydrogen liberated at the formation of humous substances, ammonia, which remains in combination with the humic acid. The possibility of a condensation of the free nitrogen of the atmosphere to ammonia results from the following experiments:—

When clean, fresh iron filings are placed in a flask moistened with a little water, and red litmus-paper suspended in it, the paper in the closed flask becomes in a few days blue.*

On the 10th of May some freshly ignited powdered charcoal was conveyed into a glass flask with hot distilled water, so that about seven-eighths of the flask remained filled with atmospheric air. On the 1st of August the charcoal was examined; it was distilled with pure caustic potash, and gave perceptible traces of ammonia. The water with which the charcoal was washed remained perfectly colorless.

Humic acid, prepared from sugar, was moistened with a little water (both free from ammonia,) and left for six months in a closed flask; upon being then treated with potash, the substance disengaged a considerable quantity of ammonia.

Well-ignited charcoal was conveyed, on the 10th of May, while hot, into a glass flask with ground stopper, sprinkled with potato-starch and moistened with water. It was examined on the 1st of August; a disengagement of gas had commenced, for on touching the stopper it was thrown out of the neck. The mixture had a very distinct smell of cheese. A portion, distilled with potash, gave abundant proofs of ammonia, far more than the charcoal alone. Washed with water, the liquid passed colorless through the filter.

Gum arabic, mixed in the same manner with charcoal,

*According to Berzelius this results from the decomposition of the coloring substance, azolitmine, when kept in a moist state. *Report* for 1844, p. 53.—Ed. *Chem. Gaz.*

gave the same result, as did likewise pure cane and milk sugar. The quantity of ammonia disengaged from the latter was considerable.

On the 10th of May a solution of pure milk-sugar in distilled water was placed in a glass-stoppered bottle, so that seven-eighths of the bottle remained filled with atmospheric air. A similar experiment was made with pure cane-sugar. Both exhibited, after a few days, mould plants, which increased rapidly, especially in the milk-sugar. On the 1st of August they were removed from the solution, submitted to dry distillation, and the distillate tested for ammonia; it was found to contain a considerable quantity.

Now, since the circumstances in which the soil is placed are perfectly identical with those to which, in the above experiments, the charcoal (and humic acid) was exposed, there must actually take place in the soil an incessant formation of ammonia from the nitrogen of the atmosphere.

The form of the mould plants from milk-sugar (few are developed from cane-sugar) is closely allied to that of *Mycoderma Vini*. These plants are said to make place for others; and if the experiment be carried on sufficiently long, one generation follows the other. The organization of plants of the simplest kind consists in the formation of cellulose on the one hand, and in proteine on the other. These two substances are absolutely necessary for the formation of the simplest cell plants. Exhausted with acetic acid, the plant developed from milk-sugar yields a liquid, in which proteine may be distinctly proved by means of ferrocyanide of potassium. The solution of the milk-sugar had remained perfectly clear in this experiment, and the plants formed in this clear solution in great number. No gases were disengaged. The cellulose therefore necessarily originates from the milk-sugar by mere separation of water.

The origin of the proteine combined with the cellulose cannot be clearly proved.

These experiments may be multiplied in the most simple

manner. All vegetable acids, and many of the indifferent substances, afford mould plants in larger or smaller quantity. Starch, above all, deserves attention in this respect. Arrow-root starch, preserved in pure water in a closed flask with air, very soon becomes turbid and opake, and forms a white precipitate. Mulder never observed during two months and a half mould form *at the top*, but in quantity *in* the mass itself, and then likewise on the surface. According to De Saussure, there originates from starch which has been exposed to the air or preserved in some bottles with air, after a few months, a mixture of sugar, gum, &c., and what in the present case deserves especial attention, a substance which he calls *ligneux amylacè*. This *ligneux amylacè* is cellulose combined with a little proteine, that is, a mould plant. De Saussure found from 4.4 to 10.53 per cent. in the starch employed. *Ligneux amylacè*, or mould plants, which afforded very considerable traces of ammonia, were likewise obtained from potato-flour that had been preserved in a close flask with pure water and pure atmospheric air for two months.

The influence of other bodies on the condensation of nitrogen to ammonia in the soil is of great importance. The nascent hydrogen which is set free from the decomposed organic substances binds the nitrogen of the atmosphere, just as iron filings and water form ammonia with the nitrogen of the atmosphere. A mixture of powdered charcoal with one-hundredth wood ashes was placed in two glass vessels, and ulmic acid, prepared from sugar, conveyed into one; both were exposed to an atmosphere free from ammonia. Brown beans were placed in the first, and white beans in the other; they were then sprinkled with distilled water, perfectly free from ammonia, and kept moist. The development and growth of the plants were extremely different in the two vessels; those in the ulmic acid vegetated powerfully, the others remained far behind. After twenty-four days they were taken out, the roots carefully freed from the charcoal with water, then dried and weighed. The residuary charcoal and the charcoal mixed

with humic acid afforded, on distillation with potash, a considerable quantity of ammonia.

Three white beans, dried at 212°, weighed 1.465; three brown beans, 1.277; three plants of the brown beans, which had grown in charcoal and ash only, dried at 212°, weighed 1.772; three of the white beans, which had grown in charcoal, ash and ulmic acid, 4.167. This experiment, therefore (and we shall return to it presently,) proves the nutritive power of the ulmic acid for the plants. The three white and the three brown beans were filed to a powder, and the plants of both treated in the same manner. The amount of ash was as follows:—

0.488 white beans, dried at 212°, yielded 0.023 ash.
0.633 of the white bean plants, 0.043.
0.403 of brown beans, 0.015.
0.605 of the plants of the latter, 0.055.

The amount of nitrogen, on the contrary, was—

	White beans.	Nitrogen.	Brown beans.	Nitrogen.
Beans	1.465	50 CbC	1.277	27 CbC
Plants	4167	160 CbC	1.772	54 CbC

Three white beans, therefore, in becoming plants in charcoal, ulmic acid and ash, had taken up more than thrice the amount of nitrogen; three brown beans in charcoal exactly twice the quantity.

It is a difficult matter to ascertain whether the organic constituents of the soil are absorbed as such by the plants. This difficulty arises principally from the circumstance of its being impossible to present the same quantity of nutriment to the plants submitted to examination; and with too large or too small a quantity results are obtained between which no comparison can be made.

Several glasses of the same size were arranged side by side in an uninhabited room, exposed to no exhalations; some coarse well-washed sand was placed in the first five, and into all the other series of five a mixture of the same sand with 1 per cent. of common wood-ashes; and, moreover, in the second

five, 5 per cent. of a mixture of different constituents of the soil, or of substances which it was interesting to examine. The substances were sprinkled with pure distilled water and kept moist.

In each series of five were planted,—1st, small brown beans; 2d, white beans; 3d, green peas; 4th, barley; 5th, oats.

After a month, from the 16th of May to the 16th of June, the following was the result of the development of the above seed:—

1. *Sand and Rain-water.*—Seed came up very sparingly, the plants scarcely a hand's span high, nearly all faded.

2. *Sand, Ashes and Rain-water.*—1st, did not germinate; 2d, very sparingly; 3d, tolerably well developed; 4th, very poor; 5th, somewhat better, but still very weak.

3. *Sand, Ashes, Ulmic Acid from Sugar, and distilled Water.*—1st, poorly; 2d, tolerably well; 3d, very well; 4th, did not come up; 5th, very well.

4. *Sand, Ashes, Apocrenate of Ammonia prepared from Sugar and distilled Water.*—None succeeded except No. 5, and this but very badly.

5. *Sand, Ashes, Humate of Ammonia from Garden Earth (Ammoniacal Extract of Humus,) distilled Water.*—None came up.

6. *Sand, Ashes, Humic Acid from Garden Earth, and distilled Water.*—1st, very beautifully developed; 2d, none came up; 3d, imperfectly developed; 4th, none came up; 5th, tolerably well developed.

7. *Sand, Ashes, Aqueous Extract of Humus, and distilled Water.*—1st, 2d, 3d and 5th, none came up; 4th, imperfectly.

8. *Sand, Ashes, Ulmate of Ammonia prepared from Sugar, and distilled Water.*—1st, 2d, 3d and 5th, very beautifully developed; 4th, imperfectly.

9. *Sand, Ashes, Humate of Ammonia from Bog Earth, and distilled Water.*—1st, 2d, 3d and 5th, very beautifully developed; 4th, did not come up.

10. *Ordinary Soil and distilled Water.*—Results perfectly identical with those of the preceding experiment.

11. *Ignited Charcoal reduced to a coarse Powder, Ashes, and distilled Water.*—All came up, but were far less developed than in the last three experiments.

If we glance at the results of these experiments, and leave out of question those substances which from some cause or other were injurious to germination (experiments 4 and 5,) it appears,—*a*, that rain-water and atmospheric air do not afford sufficient nutriment to plants; the inorganic substances are wanting; *b*, that rain-water, ashes and atmospheric air do likewise not suffice; *c*, that the aqueous extract of humus contains too little organic substance to yield to the plants what they require; *d*, that ulmic acid prepared from sugar is actually advantageous to the growth of plants, although it contains no nitrogen; *e*, that the humic acid from garden earth is extremely advantageous to the growth of plants; *f*, that the ammonia compound of this latter, as well as the acid from bog earth, produce a luxuriant development; *g*, that lastly, plants do not succeed so well in wood-charcoal and ash, as in ordinary soil, or in the substances mentioned in *e* and *f*.

Lond. Chem. Gaz., from Journ. für Prakt. Chem.

ART. XII.—ON THE JAMAICA DOGWOOD.

Dr. Hamilton, during a visit to the Antilles, was struck by the powerful narcotic effects on fish produce by the bark of the roots of the *Piscidia erythrina*, or *Jamaica dogwood.* Thinking that this might be of utility as a medicine, he found that the tincture, prepared by macerating the bark of the roots gathered during the period of inflorescence, and before the appearance of the

leaves (the piscidia being one of the few deciduous trees indigenous within the tropics,) in four times its weight by measure of *rectified* spirit for twenty-four hours, and filtering, was the only eligible mode of preparation. The following was his experiment, and its result.

"Having been for some time a martyr to the toothache, which had deprived me of my natural rest, I determined to make the first trial of my new medicine upon myself; and accordingly on going to bed, mixed a drachm-measure of the tincture with a rummer of cold water, and drank it off—waiting to observe its effects. Soon after receiving it into the stomach, I experienced a violent sensation of heat, which gradually increased in intensity, awakening in my mind a suspicion that the predictions of my friends, who assured me I should poison myself, were on the eve of fulfilment. However, the deed was done, and I resolved to abide the issue without flinching. The sensation of burning gradually extended itself to the surface, and while I was considering what antidote I ought to employ, a profuse diaphoresis burst out from every pore, and a sleep the most profound I ever experienced arrested me so abruptly, that I remained motionless for the whole night, with the uncorked phial in one hand and the glass out of which I had taken the dose in the other, till after the sun was high above the horizon on the following morning, a space of twelve good hours, when I first returned to consciousness, free from every pain or ache, and without any of those unpleasant sensations which invariably succeed to an overdose of opium.

"I had certainly taken a larger dose than was, perhaps, necessary; but the result was most triumphant. I afterwards employed it with equal success, as a topical application, in a number of cases of carious teeth, introducing it on a dossil of cotton into the diseased cavity; and after a single application, I never heard of a return of pain in that tooth. Wishing to compare its powers with those of opium, I took equal measures of water, containing the animalculæ

of the mosquito, and having dropped into one glass as much of the tincture of opium as was necessary to make them fall motionless to the bottom, I added an equal number of drops of the dogwood tincture to the other, with a corresponding effect. I then decanted the supernatant liquor, and washed the mass of animalculæ in each glass with fresh filtered water from the dripstone; after a few ablutions, those which had been stupefied by the tincture of opium recovered, and swam about with their wonted vivacity, while all my efforts to revive those acted upon by the dogwood proved ineffectual."

Dr. Hamilton subjoins certain cautions as absolutely necessary to be kept in view. "First, the bark of the roots should be collected about the period of the full moon, in April, at which time the tree is in full flower, or coming into flower, and the leaves have not yet unfolded. Next, that the best rectified spirit alone should be used in making the tincture—the active principle of the bark being only soluble in spirit, and precipitating on the addition of water, with which it makes a milky compound. It is impossible that a longer maceration than I employed might be successful in extracting more completely the active principle; but it might be desirable to divide the tincture so obtained, keeping that made during the first twenty-four hours distinct from the second, or making a portion with twenty-four hours' maceration, and another portion with forty-eight hours' or more; and comparing, by some common test, the relative qualities of each. The following is the formula for the tincture I used:

℞. Pulveris crassi Corticis Radicis Piscidiæ Erythrinæ, ℥j;
Spiritus Vini Rectificati, fl℥iv.
Macera simul per horas viginti et quatuor in vasi aperto et cola. Dosis fl℥j et infra ex haustu aquæ puræ."—*Pharmaceutical Jonrnal.*

ART. XIII.—NEW PREPARATION OF CINCHONA BARK.

M. Donovan, of Dublin, has collected a considerable amount of evidence from numerous medical authors, tending to prove that the alkaloids of the barks, quinine and cinchona, &c., are not the only constituents which give those barks their medicinal properties, but that their anti-periodic efficacy depends, in part, upon other ingredients, and much upon the combination in which the alkaloids are found in the natural state of the bark. The sulphate of quinine is, at present, the form most commonly employed, but many authorities are adduced by Mr. Donovan, to show that it cannot in all cases be depended on.

Under the impression that these preliminary points are proved. Mr. Donovan proceeds to relate his experiments, made with the view to obtain an agreeable preparation, containing all the virtues of the bark in a small bulk. "Hitherto," he says, "there has been no way of exhibiting bark in its full powers, except in the state of powder, which, to most persons, is so disgusting a dose that it is rarely prescribed." The following is the preparation which he conceives accomplishes the purpose :

Let eight ounces of yellow bark, in coarse powder, be digested with a pint of proof-spirit for a week, in a close vessel, with frequent agitation. The tincture is to be fully extracted by the screw press ; the residuum is to be digested with another pint of proof-spirit for a week, and the tincture again expressed. The residuum is now to be boiled for half an hour with a pint of water, and the decoction strongly pressed out. The boiling of the residuum a second and a third time with a new pint of water is to be performed in the same manner; and then the three decoctions, mixed, are to be evaporated by heat to eight ounces. It will be much the better if this be done in a vacuum. The tinctures

mixed. are to be distilled or evaporated until eight ounces remain; and these, still boiling hot, are to be added to the evaporated decoction. A pint of liquid will thus be produced, the chief ingredient of which is dikinate of quinina.

To this liquid add 315.31 grains of dinoxalate of quinina, and boil for a few moments; then add 21 troy ounces of refined sugar, and four ounces of best gum arabic, both in powder and previously mixed. The whole is to be kept stirring until the solution is effected; and if the resulting syrup, when cold, does not amount to 32 ounces by measure, water is to be added to make up that amount. When cold, filter through flannel.

In each ounce of this syrup there will be 16 grains of anhydrous dikinate of quinina. This syrup is twenty-five times stronger than the decoction of bark.

It remains to offer a few suggestions relative to the pharmaceutical employment of this syrup. In general it may be used in any mixture of compatible liquids, when the powers of bark are required, and when the other liquids are already sufficiently voluminous, and would be altogether too bulky if decoction of bark were employed. Thus in the simultaneous exhibition of decoctions of bark and sarsaparilla, in equal quantities, the smallest efficient dose of the mixture is six ounces three times a day. By altering the formula to fifteen and a half ounces of decoction of sarsaparilla, and five and a half drachms of syrup of bark, the same powers are exhibited in half the foregoing bulk.

The following contains all its energy in a state of perfect development and activity, and is a pleasant carminative tonic:—

Cinnamon water, six ounces and a half; syrup of bark, half an ounce; compound tincture of bark, an ounce. An ounce measure of this mixture is equivalent to thirty-six grains of bark in substance.

When bark and iron are indicated, the following is the

formula in which the least chemical action takes place between the tannin and the iron, as no discoloration appears for several days:—

Precipitated carbonate of iron, syrup of bark, of each an ounce. Mix. Dose, the size of a small nutmeg.

The strength of this syrup is such, that one drachm is a full dose, either by itself or in water. Aromatics, such as anise or fennel, are said perfectly to mask the bitterness of of preparations of quinina. M. Pierquin says, that thirty-two grains of carbonate of magnesia conceal the taste of six grains of sulphate of quinina, without interfering in its virtues.

To conclude: this preparation of bark seems deserving of the attentive consideration of physicians, as it contains all that is valuable in that medicine, in a state of perfect preservation and full energy. It presents the active ingredients exactly in their natural state, which good judges have declared to be in many forms of disease absolutely necessary. It contains nothing but what is an unaltered proximate principle of bark. The form is commodious, not liable to spoiling, is less disagreeable than any other, and may be rendered even agreeable.—*Ibid.*

ART. XIV.—ON THE MODE OF PRESERVING COLCHICUM CORMI.

BY JOSEPH HOULTON, M. D.

In the last July number of your valuable journal, you honored me by a notice of a paper of mine, on the drying of roots, &c., which had been read before the Royal Medico-Botanical Society; I therefore take the liberty to offer some further remarks on the subject—remarks which have been stated to the above-named society, but I am not aware that they have been made public. It always affords me much pleasure to contribute the humble results of my observation and experience towards the advancement of a department of science that has been till lately too much neglected; I am happy to see a spirit rising amongst the pharmaceutical chemists of our country for the improvement of pharmacy. England bids fair to be soon foremost in the field of this department, from the talent and industry that is now engaged in the work. It is curious to contemplate the position that pharmaceutical power is likely to hold in a few years' time, and also its influence, not only on science, but on institutions.

The observations which I beg to place before you are upon the method in which the cormi of colchicum should be managed, so as to insure their drying spontaneously without being sliced. It is simply this: they are to be stripped of their loose dry coats, and the bud or little bulb, the rudiment of the future plant, is to be carefully picked out—it is a very small part, but easily seen; this part has a high vital endowment, and is very tenacious of life, and unless removed the cormi will not readily become dry; yet when that is removed, in any dry place, they will become exsiccated without any trouble, and that in a short time. To show the difference that this circumstance makes, let a

few be placed in their entire state near those that have been mutilated, and the difference in a week or two will be very manifest, the entire cormi will appear quite fresh. The plan I adopt is more safe and economical than that usually followed, as the cormi are not exposed to a high temperature, nor are their juices under the direct influence of the atmosphere, both of which circumstances are injurious to the more delicate medicinal vegetable articles.

I have chosen this season of the year to make this communication, because the time is near when the cormi colchici will be ripe: they should be dried before the bud has sprouted. August is a very proper time for preparing them. I hope some, at least, of the pharmaceutical chemists will try the method, if it be but on a small scale. I cannot at present recommend it to be generally adopted, as it is contrary to the explicit orders of the College, and those who have the temerity to break the laws therein laid down, know very well that "*they will not only incur Her Majesty's displeasure, but be proceeded against for such their contempt and offence according to the utmost severity of the law.*"

But practitioners may follow the laws of nature and the dictates of their conscience in reference to pharmacy, without the fear of penal statutes, and I hope there are many who do, and that they will aid in carrying out improvements in Materia Medica, Pharmacy, and Therapeutics.

Ibid.

ART. XV.—AN ACCOUNT OF THE ARTIFICIAL FORMATION OF A VEGETO-ALKALI.

BY GEORGE FOWNES, ESQ.

THE substance which is the subject of investigation in this paper is a volatile oil, obtained by distillation from a mixture of bran, sulphuric acid and water, and is designated by the author by the name of *furfurol*. Its chemical composition is expressed by the formula C^{15} H^{6} O^{6}, and its properties are the following:—When free from water and freshly rectified, it is nearly colorless; but after a few hours, it acquires a brownish tint, which eventually deepens almost to blackness. When in contact with water, or when not properly rendered anhydrous, it is less subject to change, and merely assumes a yellow color. Its odour resembles that of a mixture of bitter almond oil and oil of cassia, but has less fragrance. Its specific gravity at 60°, Fahr., is 1.168; it boils at 323°, Fahr., and distils at that temperature without alteration. It dissolves to a large extent in cold water and also in alcohol. Its solution in concentrated sulphuric acid has a magnificent purple color, and is decomposed by water. Nitric acid, with the aid of heat, attacks the oil with prodigious violence, evolving copious red fumes, and generating oxalic acid, which appears to be the only product. It dissolves in a solution of caustic potash, forming a deep brown liquid, from which ashes precipitate a resinous matter. With a slight heat, it explodes when acted upon by metallic potassium.

When placed in contact with 5 or 6 times its bulk of *Liquor ammoniæ*, it is gradually converted into a solid, yellowish-white, and somewhat crystalline mass, which is very bulky, perfectly soluble in cold water, and easily obtained in a state of dryness under a vacuum. The formula

expressing the chemical constitution of this substance, or of *furfuroamide*, as the author calls it, is C^{15} H^{6} N O^{3}, and it is classed by him with the *amides*. The oil itself appears to be identical with the substance described by Dr. Stenhouse under the name of *artificial oil of ants*. Another substance, isomeric with the amides, and of which the formula is C^{30} H^{12} N^{2} O^{6}, was obtained by the author, and termed by him *furfurine*, and found to have the properties of a vegeto-alkali, and to form saline compounds with various acids.

Chemical Gazette.

ART. XVI.—ACETATE OF IRON AS A REMEDY FOR ARSENICAL PREPARATIONS.

The hydrated peroxide of iron is of admitted efficacy in cases of poisoning with uncombined arsenious or arsenic acid; but according to the experiments of Duflos, it is quite ineffectual when these acids are combined with bases, as for example, Fowler's solution, or arsenite of potash, or arseniate of potash, which last is frequently employed in calico-printing, and is consequently easily procured.

In the uncertainty in which the practitioner may be placed as to whether the arsenical poison be free or combined, it is very important to administer the oxide of iron in such a form as to produce a favorable result: to this end it is convenient to employ the peracetate of iron.

This compound may be prepared by adding to the hydrated peroxide of iron obtained from the decomposition of four parts of liquid perchloride of iron, three parts of acetic acid of density 1.06, and sufficient water to make up 16 parts.

This liquid, which is a solution of peracetate of iron with excess of base, precipitates arsenious and arsenic acid from all their solutions, either free, or combined with any base; 500 grains of it are sufficient to decompose 1880 grains of Fowler's solution.

This result demonstrates that liquid peracetate of iron merits preference in cases of poisoning by arsenical compounds. It should be remembered that its power is more rapid in proportion as it is more diluted with water; besides which, large dilution prevents all irritating action of the acetic acid set free. —*Ibid, from Journ. de Ch. Méd.*, Novembre, 1844, as inserted in the *Philosophical Magazine.*

[The mode of preparing the above compound is not very clearly stated, for the strength of the liquid perchloride of iron is not given. It may be presumed that peracetate of iron mixed with peroxide is to be employed; the degree of excess of the latter is of little consequence, and the strength of the peracetate is limited by the employment of four parts of acetic acid of 1.06 made up to 16 parts with water, and this, it appears, is to be largely diluted before exhibition.—Ed. *Phil. Mag.*]

As this is an important antidotal remedy, and as the term "liquid perchloride of iron" may tend to confuse many, perhaps it will be proper to state that the same preparation may be made by taking any quantity of hydrated sesquioxide of iron, prepared according to the U. S. Pharm., dividing it into two parts, then adding to one portion just as much acetic acid, of any strength, as will dissolve it, afterwards adding the other portion of hydrated oxide, and finally, as much water as will make it of the consistence of cream.—Ed. *Amer. Journ. Pharm.*

ART. XVII.—ON THE ADULTERATION OF COCHINEAL.

BY M. LETELLIER, OF ROUEN.

Two varieties of cochineal are found in commerce, the gray and the black. No satisfactory explanation has hitherto been given of this difference. Some think that it is owing to the different methods employed of killing the insect, others attribute it to a different mode of cultivation. MM. Fée, in his 'Cours d'Histoire Naturelle Pharmaceutique,' Bussy, in his 'Traité des Falsifications des Drogues simples,' and Boutron Charlard, in a note inserted in the 'Journal de Pharmacie,' vol. ii. tenth year, are of the same opinion; they think that these kinds of cochineal are only one and the same species, and the differences which are observed in them are owing to the custom of plunging the black cochineal into boiling water in order to kill it, which deprives it of the whitish powder with which it is naturally covered. The gray cochineal, on the contrary, which is killed by being exposed to the heat of an oven, preserves its proper color. M. Guibourt, contrary to these gentlemen, thinks that black cochineal is a variety produced by cultivation, and still further removed from the savage state than the gray cochineal. Black cochineal is, according to this gentleman, richer in coloring matter and held in higher estimation. In confirmation of what he advances, he states that at Bordeaux persons are employed in converting, by a peculiar process, gray cochineal into black, at an expense of fifty centimes (five pence) per pound; he also agrees with M. Bussy, that if at the present time talc or white lead is added to cochineal, it is not black cochineal which undergoes this adulteration, but gray cochineal, with the sole view of increasing its weight. According to M. Fée, gray cochineal is generally more esteemed than black, because this latter has lost a little of its coloring principle by

its immersion in boiling water at the time of gathering. He is not of the opinion of Boutron Charlard, who thinks that both are equal in quality. The latter person says, contrary to Guibourt, that black cochineal is transformed into gray, because this last is of more value.

The result of all these contrary opinions is, that it is perfectly impossible to judge of the goodness of a cochineal by its physical characters. In order to ascertain its value, we must have recourse to comparative experiments. We are indebted to MM. Robiquet and Anthon for two methods of determining the quality of cochineals according to the quantity of carmine they contain. The process of M. Robiquet consists in decolorizing equal volumes of decoction of different cochineals by chlorine. Using a graduated tube, the quality of the cochineal is judged of by the quantity of chlorine employed for decolorizing the decoction. The process of M. Anthon is founded on the property which the hydrate of alumina possesses, of precipitating the carmine from the decoction so as to decolorize it entirely. The first process, which is very good in the hands of a skilful chemist, does not appear to me to be a convenient method for the consumer; in the first place, it is difficult to procure perfectly identical solutions; in the next place, it is impossible to keep them a long time without alteration. We know that chlorine dissolved in water reacts, even in diffused light, on this liquid, decomposes it, appropriates its elements, and gives rise to some compounds which possess an action quite different from that of the chlorine solution in its primitive state. The second process seems to me to be preferable, as the proof liquor may be kept a long while without alteration. A graduated tube is also used; each division represents one hundreth of the coloring matter. Thus, the quantity of proof liquor added exactly represents the quantity in hundredths of coloring matter contained in the decoction of cochineal which has been submitted to examination.

In my investigation I have not had recourse to chemical agents as did MM. Robiquet and Anthon; I had no hope of finding a better and more simple process than those proposed by them. I employ nearly the same course for cochineal as that followed by M. Girardin for annotto. In a word, it is by colorimetric essays that I judge of the quality of the cochineals of commerce. This method appears to me so simple and so convenient, that I think it right to make it known. It enables the consumer to judge of the value of a cochineal as well as the chemist.

As I have before said, two kinds of cochineal are found in commerce, gray and black. The gray cochineal may be separated into two very distinct varieties. The first is large, heavy, regular; the eleven rings which form it are distinctly seen. The insect has pretty nearly preserved its form, convex on one side, and concave on the other; its gray color is owing to the whitish powder with which it is covered during its growth. The second variety is irregular and quite without form. The whitish coating which covers it is heaped in such great quantities in the concave part and between the rings of the insect, that it is in the form of small round masses, in which it is hard to distinguish any traces of the rings so well characterized in the first variety. This cochineal is in general the heaviest: it almost always contains, independent of the talc in which it has been rolled, some sand or metallic dust, which singularly increases its weight.

Black cochineal does not offer very distinct characteristics; it is sometimes like the gray cochineal, No. 1, heavy, concave on one side, convex on the other; at other times it is quite irregular, small and wrinkled in every direction; it is almost impossible to distinguish its first form and some traces of the rings which compose it. These latter characters belong especially to zacatillée cochineal.

Exhausted Black Cochineal.—Until 1840 the calico-printers, after having treated the cochineal at different in-

tervals with water, threw it away as completely exhausted. M. Lembine, a dyer of Rouen, was, I believe, the first whom the idea struck of ascertaining if this cochineal, which the cotton-printers threw away, was entirely deprived of its coloring principle. He found that it still contained from about 15 to 18 per cent. The dyer now buys this residue from the cotton-printer, at the price of from 1*s.* 6*d.* to 2*s.* 6*d.* the 2 lbs.; he dries it, spreads it in thin layers in a well-aired place, and preserves it in barrels for use. This cochineal having begun to undergo decomposition during its desiccation, always has a smell of putrified animal matter; it is black, quite without form, often agglomerated into more or less large masses.

Down of Cochineal.—We sometimes find a gray light substance in commerce, mixed with a great quantity of small black granules hard to the touch; this substance is known by the name of down, or cochineal siftings. MM. Fée, Boutron Charlard, Bussy and Guibourt, who have written on this insect, do not speak of this product. It contains about 20 per cent. of coloring matter.

These two products have lost much of the preference which dyers used to give them on account of the low price at which they were to be bought; because in order to obtain as beautiful a tint and as dark a one with them as that obtained with pure cochineal, three or four times as much matter is necessary, to which must always be added a small quantity of unexhausted cochineal; secondly, because this matter fills up the vats, and is very hard to detach from the tissue.

I owe to the kindness of the merchants of this town thirty specimens of cochineal, on which I have made experiments. In the houses which carry on a wholesale trade in this commodity, I have constantly found the same kinds of cochineal: the pure gray cochineal, No. 1, or gray cochineal of the Canaries, the blackish gray or zacatillée cochineal, No. 2, and the black or zacatillée cochineal, No. 3. This last is adulterated; merchants buy it as such. According to the information I

gathered from these gentlemen, a great part of the cochineals which come to Bordeaux are converted into zacatillée cochineal. There are persons in this town whose sole occupation this is. This cochineal is offered to the merchants at from 6, 8 and 10 per cent. below the current price. Guibourt, as I before said, mentions this fraud as a certain proof that the black cochineal is superior to the gray.

By examining the zacatillée cochineals of commerce attentively, knowing moreover that they are always sold below the current price, I thought that only two kinds of adulteration were possible; the first might consist in rolling the cochineal, rendered moist, in a black heavy powder (manganese for example,) to change the color and increase the weight; the second, to deprive it of the whitish layer which covers it, by soaking it in boiling water, which at the same time must take a part of its coloring matter from it, which would be made use of. The first method hardly seems probable; a part of the black dust becoming detached by rubbing would always betray the adulteration. The irregular form of this cochineal, and the roseate lustre which it presents, lead me to think that the second kind of supposed adulteration is the most likely. I am therefore of opinion, according to my experiments, that gray cochineal is treated with warm water to extract a part of its coloring principle, that by this immersion the insect is in great part deprived of the white powder which covers it, and is transformed into black zacatillée cochineal. Whether it is this or any other method which is put in practice, it is certain that the zacatillée cochineal is less rich in coloring principle. It is sold as such in commerce; but it often happens that zacatillée is advertised at 6 per cent., and that it is 10, 12, and sometimes more. Up to the present time the buyer has not possessed an easy method of appreciating the different degrees of adulteration.

In the specimens which I procured from persons who retail cochineal, I found exactly the three qualities before

mentioned, in addition the gray cochineal No. 2, which is frequently met with, and a cochineal which is quite black and contains a little sand. It is almost always in these last two that I found matters introduced to increase the weight.

When examined with a glass, the metallic powder that I obtained from four specimens only of cochineal out of twenty-three, presented all the physical characters of lead filings. Treated with nitric acid, it yielded a solution, which, when tested with chemical agents, showed all the characters peculiar to the salts of this metal.

The result from what precedes is, that the adulteration mentioned by M. Boutigny is but little spread in the wholesale trade; that this sophistication is, as I suspected, made in France and with the exhausted cochineals.

Colorimetric Tests.—I shall not describe the colorimeter, but shall refer for that to the memoir of M. Houton Labillardière, in the 'Bulletins de l'Académie Royale,' 1827, p. 73. The memoir of M. Girardin, inserted in the 'Bulletin de la Societè Libre d'Emulation,' 1836, p. 149, may be consulted.

The coloring matter of cochineal being soluble in water I have used this solvent for exhausting the different kinds which I have submitted to examination in the colorimeter. I operated in the following manner:—I took a grain of each of the cochineals to be tried, dried at 122° F.; I submitted them five consecutive times to the action of 200 grains of distilled water at water-bath heat, each time for an hour; for every 200 grains of distilled water I added two drops of a concentrated solution of acid sulphate of alumina and of potash. This addition is necessary to obtain the decoctions of the different cochineals exactly of the same tint in order to be able to compare the intensity of the tints in the colorimeter.*

* Care must be taken not to add to the water, which serves to extract the coloring matter from the different cochineals, more than the requisite quantity of acid sulphate of alumina and solution of potash, because a stronger dose would precipitate a part of the coloring matter in the state of lake.

The purchaser now examines his cochineal by dyeing a sample of wool. The result obtained is compared with that of a cochineal whose tinctorial value is known to him; he operates at water bath heat for two hours. Having begun this investigation in the hope of giving an easier and quicker process than those which have been used up to the present time, I have endeavored to extract the coloring matter of the cochineal by a single treatment. I obtained this result: that five decigrammes of cochineal, treated at water-bath heat for an hour, with 1000 grs. of spring water, and the addition of ten drops of a solution of alum, were almost entirely exhausted. The liquor when cold was perfectly transparent, and gave in the colorimeter the same results which I obtained by the first process. The apparatus which I used is composed of two flasks of about a quart capacity, suspended by their necks to a small plank, the two extremities of which rest on the edge of a cylindrical vase which serves as a water-bath for them. Before applying heat, the weight of each flask containing the cochineal and the alum water in the indicated proportions should be separately taken. After an hour's boiling it is left to cool, each flask is again separately weighed, and to each of them is added the quantity of distilled water necessary to establish the primitive weight.

Some time ago M. Boutigny sent me four specimens of cochineal which he had received from M. Pimont of Bolbeck:—1, a cochineal from the Canaries; 2, a blackish-gray or zacatillée cochineal; 3, a black or zacatillée cochineal; 4, and lastly, a small blackish-gray cochineal, known by the name of rosette cochineal. Till then I had employed as basis for my experiments cochineal from the Canaries obtained from a merchant in this town.

The rosette cochineal gave me more coloring matter. The tinctorial value is to that of the gray cochineal as 105 or 110 are to 100.

In order to estimate a cochineal in the colorimeter, two

solutions obtained, as described above, are taken; some of these solutions are introduced into the colorimetric tubes as far as zero of the scale, which is equivalent to 100 parts of the superior scale; these tubes are placed in the box, and the tint of the liquids enclosed is compared by looking at the two tubes through the eye-hole, the box being placed so that the light falls exactly on the extremity where the tubes are. If a difference of tint is observed between the two liquors, water is added to the darkest (which is always that of the cochineal taken as type) until the tubes appear of the same tint.* The number of parts of liquor which are contained in the tube to which water has been added is then read off; this number, compared with the volume of the liquor contained in the other tube, a volume which has not been changed, and is equal to 100, indicates the relation between the coloring power and the relative quality of the two cochineals. And if, for example, 60 parts of water must be added to the liquor of the good cochineal to bring it to the same tint as the other, the relation of volume of the liquids contained in the tubes will be in this case as 160 is to 100, and the relative quality of the cochineals will be represented by the same relation, since the quality of the samples tried is in proportion to their coloring power.

Conclusion.

1. The adulteration of cochineal by a metallic substance mentioned by M. Boutigny, is not of frequent occurrence in the trade, but it exists.

2. The value of the different cochineals tried may be separated into very distinct classes. The rosette cochineal and the gray cochineal, which I have always taken for comparison, appear to me to be the richest met with in the

* For diluting the liquors the same water must always be used which has served to extract the coloring matter of the cochineals under examination, otherwise the darkest decoction would pass into violet as water was added to it to bring back the tint to the same degree of intensity as that of the decoction to which it is compared.

trade. In the second rank I will place the other gray cochineals, No. 1, which I have tried, and the zacatillée cochineals. Last come the gray cochineals, No. 2, and the zacatillée cochineals, which I think adulterated and in great measure exhausted.

3. A single treatment pretty well exhausts a sample of cochineal so as to give a just notion of its tinctorial value and of its trade price.

4. I am induced to think that the richness of the cochineals depends greatly on the mode of cultivation of this insect and on the district whence it is derived.

Chem. Gaz., from Journ. de Pharm. et de Chim.

ART. XIX.—OBSERVATIONS ON ASPARAGINE.

BY M. PIRIA.

Towards the end of last winter, Dr. Menici of Pisa sent me a crystallized matter, which he had just extracted from the climbing vetch, with the request that I would examine and determine the nature of it by analysis. This sample did not seem to be sufficiently pure to be submitted to analysis; and the quantity being too small to allow of purification, I undertook to prepare the substance myself, that I might be able to submit to a careful investigation.

I sowed about 10 lbs. of seed in a closed chamber, the floor of which was covered with vegetable mould. The germination took place, the light being excluded, and the plants soon grew to a considerable height. I then gathered them, expressed the juice, and submitted it to evaporation; first of all I observed the coagulation of a great quantity of albumen; the liquid somewhat evaporated, and left

to itself, deposited a mass of crystals of the substance in question. The evaporated mother-liquors afforded a fresh crop of crystals. The substance was brown, and weighed about 340 grms. Purified by repeated crystallizations and by means of animal charcoal, it gave definitely 150 grms. of a perfectly crystallized white matter, in the form of prismatic crystals, similar to those of sugar candy.

The characters of this body, and especially the facility with which it disengaged ammonia under the influence of alkalies, led me to suspect its identity with asparagine, which was confirmed by analysis. I obtained—

Carbon - - -	31.80
Hydrogen - -	6.85
Nitrogen - - -	42.54
Oxygen - - -	18.80

The purity of the product thus obtained, its abundance, and the simple means of extracting it, lead me to think that the method of preparation just described will hereafter be adopted by chemists as preferable to every other. Independent of the discovery of this new source of asparagine, there are some important questions of chemical physiology connected with the experiment which I have described. We may ask,—1st, if the absence of light is indispensable to the production of asparagine; second if the asparagine pre-exists in the seed, or whether it is produced during the act of germination; 3d, what part asparagine performs in the economy of the plant.

It was in the hope of throwing some light on these questions that I undertook the investigations, the principal results of which are the subject of this notice. I treated some seed and some plants arising from the germination of these under the influence of light, by a process analogous to that which has been described. The seed did not supply the least trace of asparagine; the plants, on the contrary, give it in abundance. Lastly, I submitted some plants, gathered at the period of flowering and fructification, to the same

treatment; but the liquor, even highly concentrated, did not furnish crystals; however at a certain period of the evaporations an abundant deposition of a salt of lime was formed, the acid of which seemed to me to be new. We may then conclude that the seed of the vetch does not contain asparagine, and that this matter is developed in the act of germination, either in the light or in the dark, to disappear again when the plant flowers.

The production of asparagine in the dark proves that this matter does not derive its elements from the atmosphere, as is the case with so many other products which originate in vegetables under the influence of light. It is probable that a nitrogenous substance (perhaps casein) exists in the seeds in question, which is transformed into asparagine, and into other products, during germination.

Led by these views, I undertook comparative researches on the composition of the seeds, and the plants which originate from them, at the different periods of their development. I will make known the results of my experiments as soon as they are terminated; for the present, I publish the principal facts observed, in order to ensure priority.

When asparagine is not perfectly pure, it soon changes directly even in its aqueous solution; after a few days a kind of fermentation takes place in the liquor, which totally decomposes the asparagine. The surface of the liquid is covered with mould, and the liquor exhales the insupportable odour of decomposing purulent matters. The same change is manifest when a certain quantity of juice extracted from the plant is added to a solution of pure asparagine. In every case, at the end of a few days, the solution of the asparagine has disappeared, and in its place we find *succinate of ammonia*.

The last fact seemed to me important enough to be confirmed by analysis. I prepared a fresh quantity of succinate of ammonia by the same process and on a greater scale; I then transformed it into succinate of lead; this, decom-

posed by sulphuretted hydrogen, afforded a liquor from which I extracted pure crystallized succinic acid. The analysis gave—

	Found.		Calculated.
	I.	II.	
Carbon - - -	40.27	40.4	40.67
Hydrogen - -	5.28	5.1	5.08
Oxygen - -	54.45	54.5	54.25

To explain the tranformation of the asparagine into succinate of ammonia, we may suppose the pre-existence of succinic acid in the asparagine and its production by a disintegration induced by the fermentation. But this view of the subject seems improbable to me. I rather think that the crystallized asparagine, the formula of which only differs from that of succinate of ammonia by 2 equiv. of hydrogen, takes this hydrogen from the putrefying matters by virtue of an action analogous to the tranformation of blue indigo into white indigo, under the reducing influence of the organic matters undergoing putrefaction.

I hope however to resolve this questiou by direct experiment.—*Ibid, from Comptes Rendus*

ART. XVIII.—VALERIANATE OF QUININE—ITS THERAPEUTIC EMPLOYMENT—MODE OF PREPARATION AND ADMINISTRATION.

(Translated from the French—*L'Abeille Medicale.*)

Dr. Francis Devay, Physician to the Hotel Dieu de Lyon, through an essay published in the *Gazette Medicale*, directs the attention of practitioners to a new combination of valerianic acid with a vegetable alkali—quinine. We are induced to augur favorably of this union of the active principle of vale-

rian to the medicinal agent of the most powerful of our exotic products. According to Mr. Devay, this provision is fully justified by clinical verification: valerianate of quinine in small doses is anti-periodic, very effectual, and superior to the sulphate by its nevro-sthenic properties.

Doubtless the gastro-intestinal accidents produced by this latter salt have been much exaggerated; still, it is no less true that the sulphate is much more irritating than the bark in substance; first, by reason of its greater solubility; and again, because it has not the corrective properties possessed by the Peruvian bark, viz.—tannin.

It is not so with the valerianate. In this last product the quinine is modified by its intimate association with a vegetable acid, which, to a slightly perturbating action upon the nervous system, joins those eminently characteristic of Peruvian bark. There is, in this, a fact connected with therapeutic dynamics, concerning which we cannot too much engage physicians to consider attentively. Thus, as we said before, in our first memoir, valerianate of zinc is an antispasmodic raised to its highest power; so valerianate of quinine is a medicine endowed with *antiperiodic* powers of the greatest energy. This is a fact we have acquired through numerous cases zealously collected several months since. But it is due to us to say, that the administration of the valerianate will for a long time expose the practitioner to mistakes, until the apothecaries generally become experienced in its composition, and in all the minute and delicate preparations required by it. Mr. Devay remarks, that to judge of the therapeutic action of valerianate of quinine, it is necessary, first of all, to satisfy ourselves of the excellence of its composition. His experiments were made with valerianate of quinine, prepared under his supervision by Mr. Guillermond, a skilful pharmaceutist of Lyons.

Characters.

According to the analyses of the Prince of Canino, who was the first to prepare and describe valerianate of quinine, this

salt is formed of one equivalent of valerianic acid, one of quinine, and two equivalents of water, of which one constitutes its water of crystallization. The crystalline form of this salt is very different; it is octœdrical or hexædral. We have ourselves obtained it in hexædrons, flattened on two faces, and forming rhomboidal tables perfectly characterized. It is often agglomerated in light, silky masses. Independent of this last fact, the crystals are hard and tolerably heavy.

Valerianate of quinine has a slight odour of valerianic acid, and a decided bitter taste, recalling that of cinchona. It dissolves with facility in water at a common temperature. Alcohol is a better solvent; and olive oil dissolves it equally well, assisted by a slight heat. The mineral acids, and most of the organic acids, decompose it. Submitted to a heat of about 90°, crystallized valerianate of quinine loses an equivalent of water, softens, and melts like a resinous substance. Deprived of water, it is rendered insoluble in this liquid, while, on the contrary, it is very soluble in alcohol. Exposed to a higher temperature, it cannot be made to part with its other equivalent of water, but is decomposed, and mono-hydrated valerianic acid vapors are seen to escape from the resinous mass. The aqueous solutions of this salt, exposed to the heat of boiling water, also decompose, and oily drops are seen to float upon the surface of the liquid, which cannot be made to redissolve in the water, except by means of spirit of wine, and is nothing more than mono-hydrated valerianate.

Preparation.

To a concentrated alcoholic solution of quinine add valerianic acid in slight excess. Dilute the alcoholic solution with twice its volume of distilled water; mix intimately, and evaporate in a stove at a heat not surpassing 122°, Fahr. After the evaporation of the alcohol, the valerianate is exhibited in the form of handsome crystals, here and there grouped or isolated, which increase from day to day.

The valerianate of quinine may likewise be prepared by

double decomposition, in mixing sulphate of quinine with valerianate of lime or baryta, both being dissolved in weak alcohol. We have ourselves obtained this salt in mixing an alcoholic solution of the neutral sulphate of quinine with an alcoholic solution of valerianate of potash.

The process succeeds, after several successive trials, to insure the perfect decomposition of the two salts. These methods are only good in saving time; it is far better to act in a direct manner, so as to have finer and purer products.

Whatever mode of preparation be adopted, it should always be borne in mind that the solution must be evaporated slowly, with a gentle heat, and the crystals not to be separated from the mother waters except to dry them in the open air.

Valerianate of quinine may be distinguished as follows:—

1st. A concentrated alcoholic solution of valerianate of quinine precipitates the concentrated neutral aqueous solution of nitrate of silver: this precipitate is redissolved in a large quantity of water.

2d. An aqueous solution of valerianate of quinine does not precipitate one of chloride of barium.

3d. This aqueous solution, submitted to ebullition, allows some oleaginous drops of melted hydrated valerianate to separate.

4th. If this solution be treated with acids, valerianic acid is disengaged, which may easily be recognized by its odour; and if this decomposition be effected with crystallized valerianate of quinine and a concentrated liquid acid, valerianic acid will be obtained in an oleaginous form.

Mode of Administration.

Like the valerianate of zinc, this of quinine being very delicate, or more correctly speaking, easily decomposed, it is best to administer it in the most simple form: in this belongs a necessary condition to its successful use.

We mostly give it in a gummous solution. Five deci-

grammes of the salt, (8 grs.) according to our experiments with Mr. Guillermond, dissolve easily in 100 grammes of gummous vehicle. One of the great advantages of valerianate of quinine is to be able to dissolve it easily in oil, and use it in this manner for frictions and embrocations upon the region of the spleen. With this object we have made use of the following liniment:

℞	Olive oil,	60 grammes.
	Valerianate of quinine,	1 gramme.

For neuralgia we use commonly pills containing 6 centigrammes each, prescribed in the simplest manner.

To appreciate the therapeutic value of valerianate of quinine, Mr. Devay reports, out of many cases under his observation, 14, for the most part severe and complicated intermittent fevers, which were cured by the administration of valerianate of quinine, when the sulphate even proved abortive. Each dose was from 10 to 40 centigrammes (1½ to 6 grs.) a day, according to circumstances. The author cites no instances of failure, and mentions no inconvenience resulting from the employment of this new therapeutic agent.

He concludes thus:

1st. Valerianate of quinine is a superior antiperiodic to the sulphate by its nevro-sthenic properties, and because it acts in smaller doses.

2d. Its pure and simple administration is of equal value with that of cinchona and the *névritiques* combined.

3d. In fevers of the worst character (ataxiques-malignes) it is sought to render the most eminent services by its specific properties.

A. D.

MINUTES OF THE COLLEGE OF PHARMACY.

At a Stated Meeting of the Philadelphia College of Pharmacy, held 3d mo. 31st, 1845,

By a report from the Committee of Examination and Professors, the College was informed that the following gentlemen had passed a satisfactory examination, and complied with the requisitions of the College. They are therefore declared Graduates of the Institution:

William W. Webb,	Thesis on	Rubus Villosus.
William N. Needles,	"	Cornus Florida.
Caleb H. Keeney,	"	Rubus Villosus.
Joseph Allen McMakin,	"	Marrubium Vulgare.
Thomas Leidy,	"	Scuttelaria Integrifolia and Scuttelaria Hyssopifolia.

The edition of Latin Labels being nearly exhausted, a Committee of three members were appointed, with authority to publish a new edition, and use the name of the College.

The Publication Committee made a favorable report of the Journal under their care, and informed that a balance remained in their hands.

The College proceeded to the Annual Election. Ambrose Smith and Samuel F. Troth were appointed Tellers, who reported that the following gentlemen had received a majority of votes. Whereupon they were declared by the Chairman, duly elected officers of the College.

President,

DANIEL. B. SMITH.

1st Vice President,

CHARLES ELLIS.

2d Vice President,

SAMUEL F. TROTH.

Treasurer,

JOSEPH C. TURNPENNY.

Secretary,

DILLWYN PARRISH.

Corresponding Secretary,

WILLIAM HODGSON, JR.

Trustees,

DR. JOSEPH CARSON,	JOHN H. ECKY,
WILLIAM PROCTER, JR.,	WARDER MORRIS,
EDWARD PARRISH,	RICHARD W. TEST,
ALBERT S. LETCHWORTH,	WILLIAM P. TROTH.

Publishing Committee,

CHARLES ELLIS,	WILLIAM PROCTER, JR.
A. J. DUHAMEL,	AMBROSE SMITH,
DR. JOSEPH CARSON,	DR. ROBERT BRIDGES,

THOMAS P. JAMES.

Extracted from the Minutes.

DILLWYN PARRISH, Secretary.

MISCELLANY.

Variations of the Boiling Point of Water, according to the nature of the Vessels.—M. F. Marcet has made a series of careful experiments upon the variability of the boiling point of water, according to the different nature of the vessels in which the ebullition took place. The following are the results of his researches on this point:—1, the boiling point of water in glass vessels is at 100°.3 and 102° (cent.) according to different circumstances, and especially according to the variety of the glass. In these cases, the temperature of the vapour of the water is constantly the same, and some hundredths of a degree lower than when the water boils in metallic vessels. 2. Whatever may be the nature of the vessel in which the ebullition is performed, the temperature of the aqueous vapour is always inferior to that of the water which gives rise to it. The mean of this difference, in glass vessels, is about 1°.06, while in metallic vessels, it is but as 0°.15 to 0°.20. There is but one exception to this rule, and that is where the interior of the vessel in which boiling is accomplished, whether it be of glass or of metal, is covered with a thin coating of sulphur, or gum-lac, or any other substance which exercises a repulsive action on the water; the boiling water and the vapour are then of the same temperature. 3. Contrary to the opinion generally admitted, the boiling point under a high pressure is not lowest in metallic vessels, but in glass vessels, when the latter are lined interiorly with a layer of the above-mentioned substances. 4. In glass vessels, the internal surface of which is perfectly smooth, and devoid of all foreign matter, we may carry the temperature of water or of alcohol to several degrees above the boiling point, before ebullition is induced; we may thus bring the temperature of water up to 105° before ebullition takes place. If the experiment does not succeed, it is owing to the presence of foreign matters adhering to the internal surface of the glass. We may insure success by making choice of a new globe, and heating therein sulphuric acid, until it reaches × 150°, subsequently washing it out with perfectly pure water.—*London Med. Times.*

New Method of preparing Oxygen.—M. Balmain prepares oxygen by heating in a retort a mixture of three parts of bichromate of potash with four parts of concentrated sulphuric acid. This mixture furnishes, at a gentle heat, a great abundance of pure oxygen gas, which amounts to but a third of the expense of the same quantity of oxygen prepared by

means of the chlorate of potash. One atom of KCr^2 produces three atoms of free oxygen, and leaves a residue composed of $KS + Cr S^3$, with which a new quantity of bichromate may be readily prepared.—*Ibid.*

Bichloride of Hydrogen.—M. Millon states to have found a combination of hydrogen and of chlorine which contains double the quantity of chlorine that exists in hydrochloric acid. If, to hydrochloric acid, artificially cooled by means of a mixture of ice and salt, we add a small quantity of peroxide of lead, a precipitate of chloride of lead is thrown down, without any disengagement of chlorine; but we obtain a deep yellow liquid, which disengages chlorine during several days on exposure to the ordinary temperature of the air. To prove that this combination is formed of $H Cl^2$, he quotes that mercury, by its reaction upon it, produces chloride of mercury and hydrochloric acid. Zinc, added in small pieces, dissolves also without any disengagement of gas. These proofs are not very conclusive, for the same thing would take place with cold liquid hydrochloric acid in which chlorine gas had been condensed. But, on the other hand, as there exist corresponding combinations with brome and iodine, it is very probable that there also exists one with chlorine, and that it may be produced in this manner. The most easy way of preparing it would be to pass a stream of chlorine through very cold concentrated hydrochloric acid, or else to add liquid chlorine till saturation; or, again, one might endeavour to reduce, below the temperature of 0 deg. cent., a mixture of two volumes of hydrochloric acid and one volume of chlorine, and see if any condensation takes place.—*Ibid.*

Cement for Stone Ware, Earthen Ware, &c.—Is best obtained by melting together 3 parts sulphur, 2 parts white resin, 1 half part shell-lac, 1 part elemi, and 1 part mastic, with 3 parts brickdust. This cement is spread on the previously warmed surfaces.—*Chem. Gaz.*

On the Composition of the Protocarbonate of Iron. By M. Wittstein.—The carbonate of the protoxide of iron, precipitated by powdered crystalized carbonate of soda from a boiling solution of recently-prepared protosulphate of iron, washed by decantation, well-pressed in linen and dried, contains, according to Wittstein, protoxide of iron, water and carbonic acid, in the proportion of 46.7 : 13.6 : 28.7, which corresponds to the formula $FeO\ CO^2, HO$. Moreover, a variable quantity of hydrated peroxide of iron is always mixed with it. The salt becomes heated in the air, disengages carbonic acid, and passes into hydrated peroxide, losing nearly 23 per cent. in weight. The residuous reddish-brown

powder, which is free from carbonic acid, yields on ignition 22 per cent. water, which would correspond to the formula $3Fe^2O^3+8HO$. On ignition the protocarbonate of iron leaves 59.48–60 per cent. anhydrous peroxide of iron.—*Ibid, from Buchn. Repert.*

On the Preparation of pure Caustic Potash and Soda. By M. Bizio.—The best method of rendering potash and soda caustic is, according to the author, to mix a solution of 1 part of the dry carbonate salt with 1 part freshly-prepared dry hydrate of lime, and allowing it to stand in a closed vessel for 24 hours at a temperature of 68° to 78° Fahr., frequently shaking it. The potash should be dissolved in 12 to 15, the soda salt in 7 to 15 parts water; the carbonate of lime separates in a granular state, and the clear caustic ley may be decanted. A weaker ley may be obtained from the residue by fresh treatment with water.—*Ibid from Berzelius, Jahresbericht.*

Preparation of Pyrophorus from Alum. By M. Elsner.—An intimate mixture of 3 parts roasted alum and 1 of flour is conveyed into a phial, which is placed in a Hessian crucible filled up to the neck with sand; the crucible is then heated in a wind-furnace till the glass nearly melts. The phial is then stopped up and allowed to cool. A pyrophorus made from 5 parts alum and 1 part powdered charcoal, is also very good, and never fails if a sufficient heat has been employed in its preparation.—*Ibid, from Journ. für Prakt. Chem.*

On the Detection of Prussic Acid in Cases of Poisoning. By M. Witting.—The method recommended by the author in suspected cases of poisoning by prussic acid, is to mix the mass with one-sixth alcohol, and to distil off one-fourth. If it contain prussic acid, the distilled product generally evolves the peculiar smell. To this product a little caustic potash is added, and then a mixed acid solution of protochloride and perchloride of iron, when prussian blue is formed.

If it be suspected that the poisoning was effected with cyanide of potassium, cyanide of zinc, &c., some hydrochloric acid should be added along with the alcohol previous to distillation.—*Ibid, Berzelius's Jahresbericht.*

Employment of Castor oil seeds as a purgative. By Dr. Mialhe.—Castor oil according to M. Soubeiran is less purgative than the seeds which have furnished it. This is because the oil which flows from the press carries with it comparatively little of the resin which remains in the marc.

M. Mialhe reports various therapeutic results obtained by the aid of

an emulsion prepared with the fresh seeds of the Ricinus communis, which go altogether to support this opinion; because with two drams and a half (10 grammes) of the seeds deprived of their envelope an emetico cathartic effect was produced which continued during three days, without opiates, cool effervescing draught, or cataplasms being able to subdue it. An emulsion prepared with seventy-five grains (5 grammes) caused twenty-eight vomitings and eighteen alvine evacuations.

Finally with a third emulsion containing only (1 gramme) 15½ grains of the seeds, the emetico-cathartic effect was yet very marked.

M. Mialhe concludes from these facts:

1st. That the oleo-resinous principle found by M. Soubeiran in the seeds of the Ricinus exists but in very minute proportion in the oil of these seeds, whilst it is found wholly in the emulsion;

2d. That the castor oil seeds of France contain a large proportion of the emetico-cathartic principle proper to a great number of the plants of the family Euphorbiaceæ;

3d. That an emulsion of the seeds of the castor oil plant prepared with only 20, 30, or 50, centigrammes (about 8 grains) of the seeds, constitutes perhaps the most agreeable purgative to the taste, of all those now in use, if the emetic action of this emulsion ceases when the dose of the seeds is properly diminished. Although this last peculiarity has not yet been proven by clinical observation it is probable that it is real, because the active principle of the Ricinus communis is analogous if not nearly identical with that of the croton oil. Now it is said that this last oil, which is simply purgative in doses of one drop, becomes emetico-cathartic by increasing this small dose.—*L'abeille Med. from Bull. de Ther.*

Purification of Naphtha.—Dissolve 15 drams of chromate of potassa in 30 drams of water, place the solution in a large bottle containing two pounds of colored naphtha. Agitate the mixture several times, every day for a month and keep it in a light place. At the end of this time the naphtha is no longer red, and the resinous and soft portion is deposited at the bottom with the solution of chromate of potassa. By decanting with a syphon the naphtha is obtained perfectly white, without odour, and deprived of its impurities.—*L'abeille Med. from Echo du Monde Savant.*

Purification of Linseed Oil.—Take two pounds of protosulphate of iron, dissolve it in six pints of rain water, and throw the solution in a large bottle already containing the linseed oil. The mixture is put in a light place, and agitated once or twice a day, during 4 or 6 weeks. After this time the linseed oil is perfectly purified and white; all its mucilage and vegetable albumen is precipitated in the solution of sul-

phate of iron. It is then carefully decanted from above the solution and deposite, and a perfectly white and well purified linseed oil is obtained, and which moreover dries very easily. The sulphate of iron employed in this operation will serve again if the solution is filtered and evaporated to crystallization.—*Ibid.*

Dentifrice of M. Mialhe.

Take of

Sugar of milk or Lactine - -	400	grammes
Pure tannin - - - -	6	"
Carmine lake - - - -	4	"
Ess. of mint (English) - - -		
Ess. of anise - - - of each	8	drops
Ess. of orange flowers - - -	4	"

Grind the Tannin and Lake with a small quantity of lactine carefully in a flat bottomed porcelain mortar, and add afterwards the remainder of the sugar of milk and the essences, and triturate until the mixture be perfectly homogeneous. The sugar of milk, although soluble, is sufficiently *resisting* to act mechanically on the enamel of the teeth without altering it, and the tannin is useful from its astringency in keeping the "gums" in a proper state of tonicity.

Reagents to distinguish between Cherry Laurel Water and that of Bitter Almonds.—According to M. Weber, ammonia will establish a marked difference between these two distilled waters, when treated in the following manner: Take two test-glasses, and pour into them separately a few drops of these two waters, then add to each a drop of liquid ammonia. Agitate, and then allow it to remain quiet; the cherry laurel water acquires a milky color, while that of bitter almonds undergoes not the slightest change.

Dr. Aschoff has observed that thirty drops of cherry laurel water, form with five of sulphate of quinia, a solid mass, while the same phenomenon is not produced with the concentrated water of bitter almonds. The volatile oils of the same products present analogous differences when submitted to the same proof.—*Journ. de Chim. Med.*

Note upon Cantharides. By M. Batka.—We owe to Dr. Metrenheimer, of Giessen, the fact, that the Lytta Syriaca is mixed with the cantharides of commerce. I confine myself to stating this fact, observing, nevertheless, that I have never found this insect in the cantharides of Hungary, as states Dr. M., but very often in that of Moldavia. Once such admixture, which I had not observed, was the cause

of considerable loss to me, the purchaser refusing the cantharides, because not genuine and of inferior quality. In fact, the Lytta Syriaca is one-third smaller than the Lytta Vesicatoria, and its red tarsus is less vesicating, as has been proved by experiment. Although this admixture has been rarely observed since in commerce, it has appeared to me that it would be proper to point it out.—*Journ. de Pharm.*

Aqueous infusion of Galls as a test.—This is best prepared according to M. Pettenkofer by infusing one part of pounded galls in three or four parts of water, allowing it to stand for several hours, straining, submitting the residue to pressure, adding to the turbid liquid two parts of common salt, and separating by filtration the glutinous precipitate which is produced. This liquid retains its transparency and power of precipitating gelatin for years—*Buchn. Repert. and Chem. Gaz.*

Preparation of Mercurial Ointment.—M. Heusler recommends the following method:—6 oz. of Mercury, 2 oz. of Suet, and 6 oz. of Lard, are rubbed together in a shallow iron mortar with the addition of about a drachm of sulphuric ether at intervals, until all the globules have disappeared.

The process occupies about three quarters of an hour, and the quantity of ether required is about 7 drachms.—*Jahrb. für Prakt. Pharm. and Chem. Gaz.*

Aqua Sinapis.—According to M. Heusler by the distillation of 18 oz. of coarsely powdered black mustard, with 8 oz. of alcohol and sufficient water, until 36 ounces have passed over, a liquid is obtained, which, when applied to the skin or linen moistened with it, acts more quickly and powerfully than an ordinary mustard-poultice.—*Ibid.*

Preparation of pure Nitrogen.—Pure nitrogen is obtained in abundance according to E. Marchand, by submitting to distillation in a retort, a solution of chloride of lime and caustic ammonia.—*Jour. de Chim. and Chem. Gaz.*

Preparation of Carbonate of Potash free from Silica from ordinary Pearl Ash.—One pound of pearl ash is dissolved in one pound of rain water, and four ounces of finely pulverized vegetable charcoal are added to it; it is left for twenty-four hours, being frequently stirred and then filtered. On evaporation and saturation with an acid it will be found not to contain a trace of silica which is otherwise so difficult to remove.—*Jour. für Prakt. Chem. and Chem. Gaz.*